Re: PER Drainage design review

(b) (4) @gallupsurveyors.com>

Mon 11/11/2013 11:32 AM

To (b) (4) @eaest.com>;

Cc: Sturgeon, Randy <Sturgeon.Randy@epa.gov>; (b) (4) @eaest.com>; (b) (4) @advantusstrategies.com (b) (4) @advantusstrategies.com>; (b) @salmonsinc.com (b) (4) @salmonsinc.com>;

Categories: PER

1 attachments (3 MB)

PER DITCH STUDY.pdf;

Gentlemen,
See my response to comment 4 below, along with the attachments. Please call or write me if you have any questions.
Thanks-
David Butler

----- Original Message -----
From: (b) (4)
To: (b) (4) @gallupsurveyors.com)
Cc: Sturgeon, Randy (Sturgeon.Randy@epa.gov) ; (b) (4) (b) (4) @advantusstrategies.com> (b) (4) @advantusstrategies.com) ; (b) (4) (b) (4) @salmonsinc.com)
Sent: Wednesday, October 23, 2013 1:55 PM
Subject: PER Drainage design review

(b)

EA has reviewed the latest drainage design and calculations for the PER property sent to EA on October 22. EA concurs with the submitted calculations and approach to manage the 100-year runoff from the 3975 Elm Avenue property. However, the pre- versus post-development ponding conditions have still not been quantified along the 3975 Elm Avenue/PER property line to show improvements to drainage conditions (see #4 below). The storm drain plan view layout has not changed since the last submittal but the storm drain pipe sizes have been increased and the pipe inverts have generally been lowered to decrease the water surface elevations in the system during the 100-year rainfall event. Additionally, a TideFlex valve has been added to the outfall of the storm drain system which conveys water from the 3975 Elm Avenue property. The following are EA comments provided to you on October 2 (in black) followed by EA's observations of the revised October 22 submission in red:

1. The times of concentration for runoff to reach each inlet appear high. This would affect the rainfall intensity, design flow rates, and performance of the system. Please confirm that 20-25 minutes is appropriate for the small drainage areas, especially since much of the area contains impervious surfaces.

The times of concentration have been revised and are appropriate for the drainage area size and land use. Additionally, the runoff coefficients (indicating imperviousness) have been revised to assume the 3975 Elm Avenue property will be fully developed in the future. Previous comment has been satisfied.

2. There appears to be a problem with the hydraulic grade line (HGL) calculations. Many of the computed HGLs are below the pipe inverts (Inlets 7, 6A, 4, 3, 2, 1, and 1A). This may be due to the friction slope used in the HGL calculations which are significantly different from the pipe slopes.

The hydraulic grade line calculations have been revised. The HGLs downstream of the 3975 Elm Avenue property are well below the proposed ground elevation of the PER improvements. HGLs along the 3975 Elm Avenue/PER property boundary are discussed in detail below.

3. Once the HGLs are corrected, it will be important to check the HGL at each manhole/flared end section (FES) along the PER/3975 Elm Avenue property line to make sure water is not ponding along the proposed retaining wall. As a suggestion, it appears that the storm drain could be lowered to accommodate total capture of runoff from the 3975 Elm Avenue property with no backup. See attached "property line" pdf for concept. Please provide similar cross sections at critical points along the retaining wall for review (especially at STMH-4). Mr. (b) is concerned with additional flow/velocity along the 3975 Elm Avenue property undercutting the existing concrete pad on his property. A cross section with HGL shown (similar to the attached pdf) may ease those concerns.

The HGL at each manhole/FES along the 3975 Elm Avenue/PER property line are contained within the existing ditch. There are 5 FESs along the property line that collect runoff from the 3975 property ranging in size from 12 inches to 36 inches. Water will pond in the ditch while the storm drain is flowing full during the 100-year storm event up to 1 foot as runoff enters the FESs.

4. Pete met with Mr. (b) (6) on 9/24 to discuss drainage patterns of the 3975 Elm Avenue property. Attached is an annotated C2 sheet indicating the drainage patterns on the property as described by Mr. (b) (6) and as confirmed during the visit. EA strongly suggests using similar drainage area delineations to the attached annotations to demonstrate to Mr. (b) that his concerns have been addressed. Also, Mr. (b) is very concerned about the capacity of the ditch between the PER property and his, and he is also very concerned about maintaining positive drainage from this area in the pipe along the swale alignment you are proposing. EA strongly suggests that you perform a pre-development conditions analysis to demonstrate that the proposed PER development will improve the drainage along the PER/3975 Elm Avenue property boundary in the post-development condition. This could be demonstrated through improved water surface elevations and lack of ponding in the ditch between the two properties.

The drainage areas have been revised per EA recommendations and recommended flow patterns have been accounted for. There is ponding in the ditch of up to one foot while runoff enters the storm drain system. Although the system has been designed to collect runoff and convey flows to the outfall effectively, without any significant ponding, it is unknown how this compares to the pre-development condition water surface elevations in the ditch as a pre-development analysis was not performed for comparison. EA still strongly suggests showing a calculation for the pre-development condition runoff and corresponding depth in the property line ditch for comparison to the post-development condition. It is anticipated that a simple flow rate calculation for the 3975 Elm Avenue property and a cross section calculation using Manning's equation would be sufficient to show the pre-development flow depth in the ditch. Additionally, EA recommends adding check dams immediately downstream of each lateral inlet/FES into the main pipeline along the PER/3975 Elm Avenue property boundary to more effectively collect and drain the runoff from the ditch and to reduce the potential of bypass.

Check dams have been added just downstream of flared end sections at structures 1, 1A, 2, and 3. See plan sheets C4 and C5 and detail shown on sheet C7. Calculations for pre and post ponding elavations for two cross sections, A-A and B-B are provided on three 8.2 x 11 sheets. Conclusions on the bottom of sheets 2 and 3 show a lower water surface elevation in the ditch, post developed situation. The ditch in a pre developed state does not have adequate capacity for most of its length. The ditch, altered with the addition of a retaining wall, has capacity and 100 year flows are contained. The reason for the radical difference in pre and post states is most of the water that outfalls to the ditch from the (b) (6) side is intercepted by a new flared end section and piped in an storm sewer independent of the PER storm sewer. Additional, some of the overland flows from the PER site are eliminated in the post development state. See 2 attached drainage area maps. The (b) (6) water is piped and outfalls in the upper reaches of the current ditch and because of lack of slope and the general geometry of the trapazoidal ditch, it does not have capacity for the design storm in its existing predeveloped state. If and when the (b) (6) tract is developed, PER will have provided a storm sewer to accommodate 100 year (quanity, not quality) flows from the (b) site.

Please let Jason Coleman or myself know if you have any further questions.

Pete Pellissier

PRE DEVELOPMENT CALCULATIONS FOR BOUNDARY DITCH

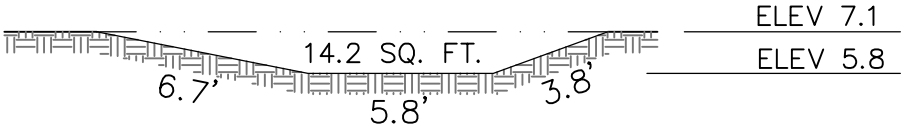
CHECK WATER SURFACE ELEVATION OF EXISTING DITCH BETWEEN PER AND DIXON: THE WATER SURFACE ELEVATION WILL BE CHECKED AT VARIOUS LOCATIONS ALONG THE RECENTLY CUT PERIMETER DITCH BASED ON FLOWS FROM A PRE DEVELOPMENT STAGE. THE DIXON PROPERTY HAD A DITCH IN THE SAME GENERAL LOCATION PRIOR TO PER PURCHASING THE PROPERTY AND THAT DITCH IS DEPICTED ON THE STEVE BOONE TOPOGRAPHIC SURVEY. SHORTLY AFTER PER PURCHASED AND CLEARED THE PROPERTY, A NEW TRAPAZOIDAL DITCH WAS CUT. THIS DRAINAGE ANALYSIS WILL ATTEMPT TO DETERMINE THE WATER SURFACE ELEVATION IN THE RECENTLY CUT TRAPAZOIDAL DITCH BASED ON A PRE DEVELOPMENT STATE.

PER PLANS ON INSTALLING A RETAINING WALL ON THE PER SIDE, 36" EAST OF THE COMMON BOUNDARY LINE. INSTALLING THE WALL WILL ALTER THE CROSS SECTIONAL GEOMETRY OF THE TRAPAZOIDAL DITCH. CALCULATIONS WILL BE PERFORMED TO DETERMINE THE WATER SURFACE ELEVATION OF THE ALTERED DITCH BASED ON POST DEVELOPMENT CONDITIONS.

SECTION A–A SHOWN ON PRE DEVELOPMENT DRAINAGE AREA MAP:

TOTAL DRAINAGE AREA: 135,343 S.F.=3.1070 ACRES
PERVIOUS AREA @ C FACTOR=0.2, 37,539 S.F.=0.8618 ACRES; CA=0.1724
PERVIOUS AREA @ C FACTOR=0.3, 42,388 S.F.=0.9731 ACRES; CA=0.2919
IMPERVIOUS AREA @ C FACTOR=0.9, 55,416 S.F.=1.2722 ACRES; CA=1.1450
SUM OF THE CA's=1.6093; C=0.5179

TIME OF CONCENTRATION:
200 L.F. OF OVERLAND FLOW @ 1.5% = 22.5 MINS
151 L.F. OF CHANNEL FLOW @ 1.5 FPS = 1.7 MINS
SUM Tc = 24.2 MINS
I100 = 285.2/24.7+24.2 = 5.83 IN/HR.
I10 = 201/23.9+24.2 = 4.18 IN/HR.
Q100=1.6093 X 5.83 = 9.4 CFS
Q10=1.6093 X 4.18 = 6.7 CFS



SECTION A–A

WP=6.7+5.8+3.8=16.3'
XS AREA=14.2 S.F.
R=A/WP = 14.2/16.3 = 0.87
N FACTOR FOR LINING=0.45
SLOPE OF DITCH=0.005 FT/FT

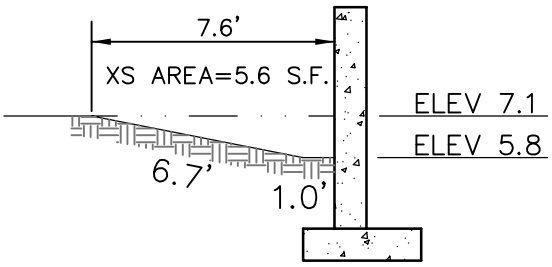
$Q=1.486/N \times A \times R^{0.67} \times S^{0.50}$ EQUALS DITCH CAPACITY
Q CAPACITY=3.02<<6.7 OR 9.4 CFS

WATER SURFACE ELEVATION AT SECTION A–A IS 7.1 SINCE IT IS NOT CONTAINED WITHIN THE GEOMETRY OF THE DITCH SECTION.

POST DEVELOPMENT CALCULATIONS FOR BOUNDARY DITCH

NOTE:
END SECTION AT STMH–1 TAKES IN 1.93 ACRES FROM THE DIXON TRACT PIPE OUTFALLING AT THAT LOCATION. 1.93 ACRES WILL NO LONGER FLOW THROUGH THE DITCH, BUT WILL BE INTERCEPTED BY THE NEW PER STORM DRAIN AT STMH–1

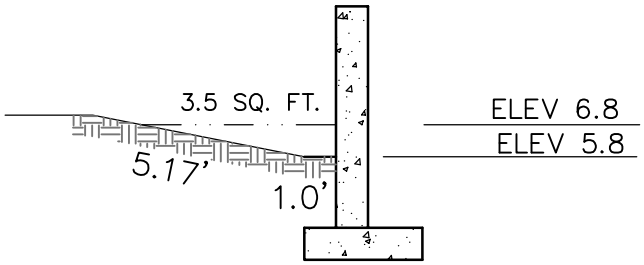
AREAS DRAINING TO THE DITCH AT AND UPSTREAM OF SECTION A–A
3199 S.F. = 0.0734 AC. X 0.5 = CA = 0.0367
1672 S.F. = 0.0384 AC X 0.5 = CA = 0.0192
SUM CA's: 0.0559
Tc=5 MINS, I100=28502/24.7+5 = 9.60 IN./HR.
Q100=0.0559 X 9.6 = 0.54 CFS



SECTION A–A

WP=6.7+1.0=7.7
XS AREA=5.6 S.F.
R=A/WP = 5.6/7.7 = 0.73
N FACTOR FOR LINING=0.45
SLOPE OF DITCH=0.005 FT/FT

$Q_{CAPACITY} = 1.486/N \times A \times R^{0.67} \times S^{0.50}$ = 1.05 CFS AT FULL DEPTH OF 1.3'



WATER DEPTH OF WATER=12": (ELEV 6.80)

WP=5.17+1.0=6.17
XS AREA=3.54 S.F.
R=A/WP = 3.54/6.17 = 0.57
N FACTOR FOR LINING=0.45
SLOPE OF DITCH=0.005 FT/FT

HW ELEV. FROM PIPE CALCULATION SHEET LD–269 SHOWS A HEADWATER ELEV. OF 6.67
6.80 > 6.67; CONTROLLING ELEV=6.80

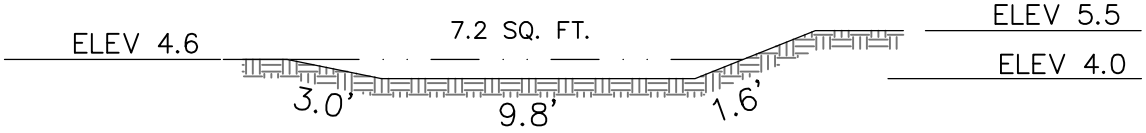
$Q_{CAPACITY} = 1.486/N \times A \times R^{0.67} \times S^{0.50}$ = 0.56 CFS, APPROX. = TO 0.54 CFS

CONCLUSION:
THE 100 YEAR STORM ON A PRE DEVELOPED CONDITION IS NOT CONTAINED IN THE EX. DITCH SECTION AND WILL REACH A MIN. ELEVATION OF 7.1 (TOP OF DITCH BANK); SINCE WATER IS REMOVED FROM THE DITCH VIA ONSITE GRADING AND WITH THE ADDITION OF A FES AT STMH–1, THE WATER SURFACE PROFILE ELEVATION IS LOWER AT POST DEVELOPED CONDITIONS.

PRE DEVELOPMENT CALCULATIONS FOR BOUNDARY DITCH

AREAS:
3.107 AC. AT C=0.5179, CA=1.6091
1.2495 AC. AT C=0.25; CA=0.3123
SUM CA's = 1.9214
TIME OF CONCENTRATION:
OVERLAND FLOW TIME=22.5 MINS
CHANNEL TIME. 626 L.F. @ 1.5 FPS=6.95 MINS
SUM Tc = 29.45 mins
1100=285.2/24.7+29.45 = 5.26 IN./HR.
Q100=1.9214 X 5.26 = 10.1 CFS

AVE DITCH SLOPE FROM XS A TO XS B: 5.9−4.7/475' = 0.0025 FT/FT
XS AREA TO ELEV. 4.6 = 7.2 S.F.
WP=3.0+9.8+1.6=14.4'
R=7.2/14.4=0.50
N FACTOR FOR LINING=0.45

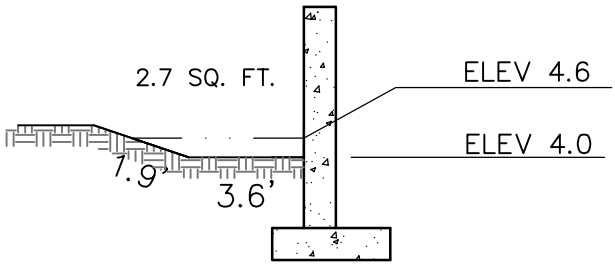


SECTION B−B

$Q=1.486/N \times A \times R^{0.67} \times S^{0.50}$ EQUALS DITCH CAPACITY
Q CAPACITY=0.74<<10.1 CFS

DESIGN STORM ON A PRE DEVELOPED CONDITION
IS NOT CONTAINED IN THE DITCH GEOMETRY

POST DEVELOPMENT CALCULATIONS FOR BOUNDARY DITCH

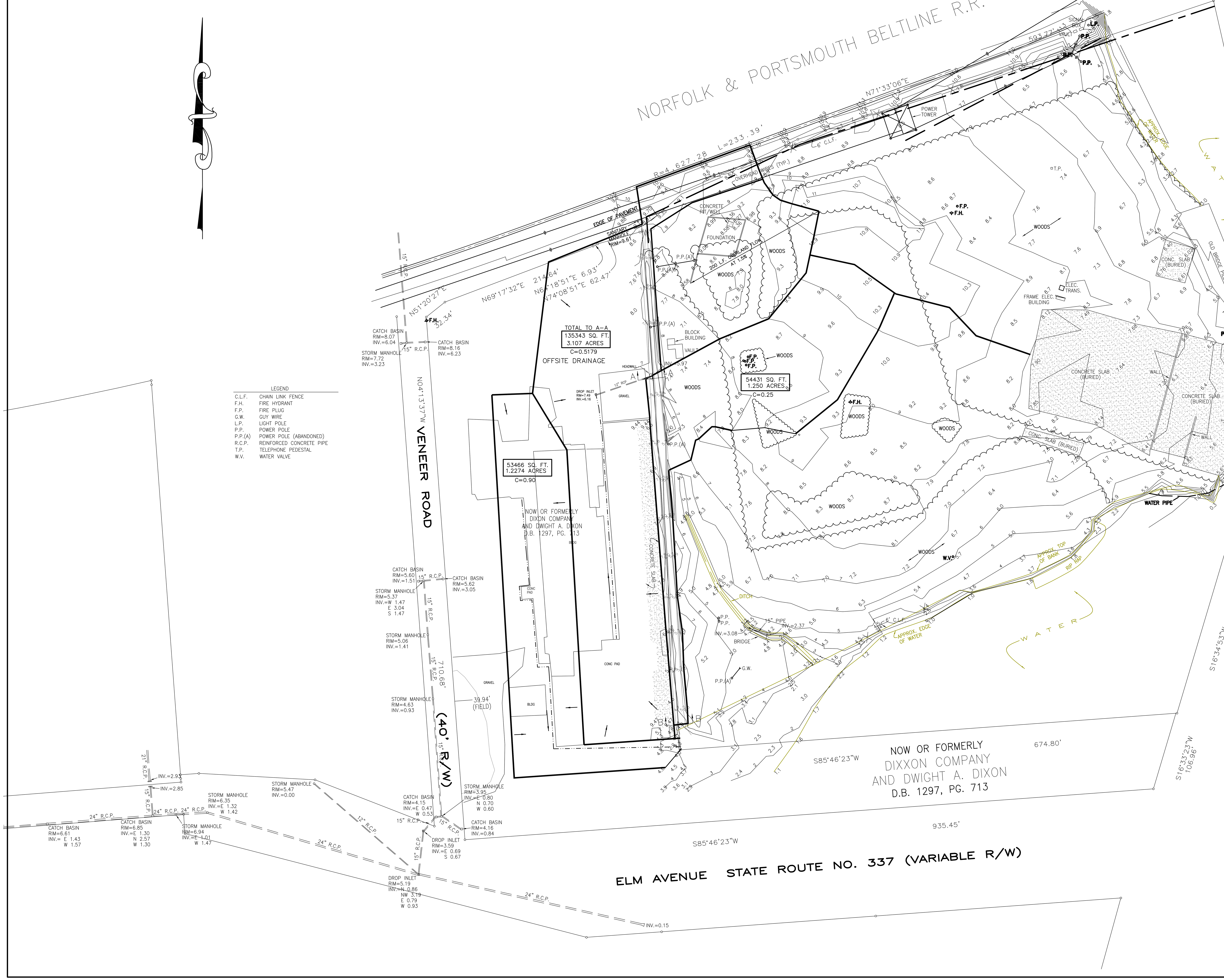


AREA DRAINING TO XS−B:
1514 S.F.=0.0347 AC.
C=0.50
CA=0.0173
Tc=5 MINS, I100=9.60 IN/HR
Q100=0.17 CFS

SECTION B−B

N FACTOR FOR LINING=0.45
AVG. DITCH SLOPE FROM XS A TO XS B: 5.9−4.7/475' = 0.0025 FT/FT
XS AREA TO ELEV. 4.6 = 2.7 S.F.
WP=1.9'+3.6'=5.5'
R=2.7/5.5=0.49
$Q=1.486/N \times A \times R^{0.67} \times S^{0.50}$ EQUALS DITCH CAPACITY
Q CAPACITY=0.28 CFS

CONCLUSION:
Q100 POST DEVELOPMENT=0.17 CFS
DITCH CAPACITY=0.28 CFS
WATER SURFACE ELEV. WILL BE LESS THAN TOP OF BANK ELEV OF 4.6
WATER SURFACE ELEV BEFORE DEVELOPMENT IS AT TOP OF BANK ELEV OF 4.6
SINCE THE STORM IS NOT CONTAINED.



PRE DEVELOPMENT DRAINAGE MAP

PORTSMOUTH TERMINAL FACILITY

PROJECT LOCATED IN: VIRGINIA BEACH, VIRGINIA		MADE FOR: PER PROPERTIES	
DESIGN BY: BWG	DRAWN BY: JB	CHECKED BY: BWG	DATE: OCTOBER 2, 2013
GALLUP SURVEYORS & ENGINEERS, LTD. 323 FIRST COLONIAL ROAD VIRGINIA BEACH, VIRGINIA 23454 (757)428-8132 (757)425-2390 FAX		SCALE: 1" = 60'	SHEET 3/13 C3
		FILE NO.:	

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DRAINAGE STRUCTURE SCHEDULE

1A. STMH
RIM 10.50
INV 4.37

1. STMH
RIM 10.50
INV 4.24

2. STMH
RIM 10.50
INV 4.04

3. STMH
RIM 10.50
INV 3.73

4. STMH
RIM 8.20
INV (N) 3.51
INV (E) −0.14
INV (W) 2.50

5. STMH
RIM 10.20
INV −0.37

6. DI
RIM 9.40
INV (E) −0.58
INV (W) 1.87
INV (S) 3.41

7. STMH
RIM 10.50
INV −0.86

5A. DI
RIM 9.10
INV 5.09

10A. DI
RIM 9.80
INV 4.25

8. STMH
RIM 10.50
INV −1.05

10. DI
RIM 9.80
INV 4.77

11. DI
RIM 9.80
INV 3.73

12. STMH
RIM 10.40
INV 3.33

12A. DI
RIM 9.50
INV 3.13

13. DI
RIM 9.35
INV 2.49 (E,W,S)
INV 7.29 (N)

14. DI
RIM 9.35
INV 2.96

15. DI
RIM 9.35
INV 3.23

7A. DI
RIM 9.50
INV (N,S) 2.00
INV (E) 4.00

8A. RIM 9.60
INV 3.44

9A. RIM 9.35
INV 4.09

6A. RIM 9.80
INV −0.57

10−10A
208'−24" HDPE @ 0.25%
INV IN 4.77, INV OUT 4.25

10A−11
207'−24" HDPE @ 0.25%
INV IN 4.25, INV OUT 3.73

11−12
198'−24" HDPE @ 0.20%
INV IN 3.73, INV OUT 3.33

12−12A
59'−24" HDPE @ 0.34%
INV IN 3.33, INV OUT 3.13

12A−13
191'−24" HDPE @ 0.34%
INV IN 3.13, INV OUT 2.49

RR−13
117'−12" HDPE @ 1.03%
INV IN 8.50, INV OUT 7.29

9A−8A
109'−18" PERFORATED HDPE @ 0.60%
INV IN 4.09, INV OUT 3.44

15−14
89'−18" HDPE @ 0.30%
INV IN 3.23, INV OUT 2.96

14−13
196'−24" HDPE @ 0.24%
INV IN 2.96, INV OUT 2.49

13−7A
215'−18" PERFORATED HDPE @ 0.23%
INV IN 2.49, INV OUT 2.00

7A−6
344'−36" CL. IV RCP @ 0.62%
INV IN 4.00, INV OUT 1.87

8A−7A
215'−24" CL. IV RCP @ 0.67%
INV IN 3.44, INV OUT 2.00

5A−6
330'−15" HDPE @ 0.51%
INV IN 5.09, INV OUT 3.41

6−OUTLET
144' 42" HDPE @ 0.50%
INV IN −0.58, INV OUT −1.30
PROVIDE TIDEFLEX TF−1
ON OUTLET END

NOTES:

THE SILT SACK PRODUCT SHOWN ON SHEET C7 IS TO BE USED IN ALL STORM DRAIN INLETS AND IS TO REMAIN PERMANENT FOR DRAINAGE STRUCTURES 7A, 8A, 9A, AND 13.

THE INVERTS SHOWN ON THE DROP INLET DENOTES THE INVERT OF THE PIPES. PROVIDE A 12" DEEP SUMP (BELOW THE PIPE INVERT) ON THE DROP INLETS FOR MAINTENANCE PURPOSES FOR STRUCTURES 7A, 8A, 9A, AND 13.

O.W. DENOTES REQUIRED OBSERVATION WELLS; SEE DETAIL ON SHEET C9.

ALL DRAINAGE STRUCTURES ARE TO RECEIVE INLET SHAPING.

FINAL SURFACE WILL BE GRAVEL AND CRUSHED CONCRETE

PIPE SCHEDULE

4−5
150'−36" HDPE @ 0.15%
INV IN −0.14, INV OUT −0.37

5−6A
154'−36" HDPE @ 0.13%
INV IN −0.37, INV OUT −0.57

6A−7
220'−36" HDPE @ 0.13%
INV IN −0.57, INV OUT −0.86

7−8
158'−36" HDPE @ 0.12%
INV IN −0.86, INV OUT −1.05

8−OUTLET
152'−36" HDPE @ 0.12%
INV IN −1.05, INV OUT −1.23
PROVIDE TIDEFLEX TF−1
ON OUTLET END

1A−1
134'−12" HDPE @ 0.10%
INV IN 4.36, INV OUT 4.23

1−2
119'−30" HDPE @ 0.17%
INV IN 4.23, INV OUT 4.04

2−3
204'−30" HDPE @ 0.15%
INV IN 4.04, INV OUT 3.73

3−4
156'−30" HDPE @ 0.15%
INV IN 3.73, INV OUT 3.50

AT STMH−2:
10'−18" HDPE WITH 18" FES
INV IN 5.50, INV OUT 4.04

AT STMH−4:
6'−36" HDPE WITH 36" FES
INV IN 2.85, INV OUT 2.50

AT STMH−3:
10'−18" HDPE WITH 18" FES
INV IN 4.80, INV OUT 4.23

AT STMH−1A:
10'−12" HDPE WITH 12" FES
INV IN 5.90, INV OUT 4.36

AT STMH−1:
10'−30" HDPE WITH 30" FES
INV IN 5.80, INV OUT 4.23

NOTE:
ALL BUILDING STRUCTURES ARE FUTURE AND ARE TO BE APPROVED SEPARATELY.

0' 60' 120' 180'

0' 60' 120' 180'

DATE | COMMENT
REVISION SCHEDULE

POST DEVELOPMENT DRAINAGE MAP

PORTSMOUTH TERMINAL FACILITY

PROJECT LOCATED IN: VIRGINIA BEACH, VIRGINIA
MADE FOR: PER PROPERTIES
DESIGN BY: BWG DRAWN BY: JB CHECKED BY: BWG
DATE: OCTOBER 2, 2013
SCALE: 1" = 60'
SHEET 3/13
FILE NO.: .
C3

GALLUP
SURVEYORS & ENGINEERS, LTD.
323 FIRST COLONIAL ROAD
VIRGINIA BEACH, VIRGINIA 23454
(757)428-8132 (757)425-2390 FAX

COMMONWEALTH OF VIRGINIA
DAVID R. BUTLER
LIC. No. 38395
10/2/13
PROFESSIONAL ENGINEER

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PIPE SCHEDULE

10–10A
208'–24" HDPE @ 0.25%
INV IN 4.77, INV OUT 4.25

10A–11
207'–24" HDPE @ 0.25%
INV IN 4.25, INV OUT 3.73

11–12
198'–24" HDPE @ 0.20%
INV IN 3.73, INV OUT 3.33

12–12A
59'–24" HDPE @ 0.34%
INV IN 3.33, INV OUT 3.13

12A–13
191'–24" HDPE @ 0.34%
INV IN 3.13, INV OUT 2.49

RR–13
117'–12" HDPE @ 1.03%
INV IN 8.50, INV OUT 7.29

9A–8A
109'–18" PERFORATED HDPE @ 0.60%
INV IN 4.09, INV OUT 3.44

15–14
89'–18" HDPE @ 0.30%
INV IN 3.23, INV OUT 2.96

14–13
196'–24" HDPE @ 0.24%
INV IN 2.96, INV OUT 2.49

13–7A
215'–18" PERFORATED HDPE @ 0.23%
INV IN 2.49, INV OUT 2.00

7A–6
344'–36" CL. IV RCP @ 0.62%
INV IN 4.00, INV OUT 1.87

8A–7A
215'–24" CL. IV RCP @ 0.67%
INV IN 3.44, INV OUT 2.00

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330'–15" HDPE @ 0.51%
INV IN 5.09, INV OUT 3.41

6–OUTLET
144' 42" HDPE @ 0.50%
INV IN –0.58, INV OUT –1.30
PROVIDE TIDEFLEX TF–1
ON OUTLET END

4–5
150'–36" HDPE @ 0.15%
INV IN –0.14, INV OUT –0.37

5–6A
154'–36" HDPE @ 0.13%
INV IN –0.37, INV OUT –0.57

6A–7
220'–36" HDPE @ 0.13%
INV IN –0.57, INV OUT –0.86

7–8
158'–36" HDPE @ 0.12%
INV IN –0.86, INV OUT –1.05

8–OUTLET
152'–36" HDPE @ 0.12%
INV IN –1.05, INV OUT –1.23
PROVIDE TIDEFLEX TF–1
ON OUTLET END

1A–1
134'–12" HDPE @ 0.10%
INV IN 4.36, INV OUT 4.23

1–2
119'–30" HDPE @ 0.17%
INV IN 4.23, INV OUT 4.04

2–3
204'–30" HDPE @ 0.15%
INV IN 4.04, INV OUT 3.73

3–4
156'–30" HDPE @ 0.15%
INV IN 3.73, INV OUT 3.50

AT STMH–2:
7'–18" HDPE WITH 18" FES
(LENGTH INCLUDES FES)
INV IN 5.50, INV OUT 4.04

AT STMH–4:
6'–36" HDPE WITH 36" FES
(LENGTH INCLUDES FES)
INV IN 2.85, INV OUT 2.50

AT STMH–3:
7'–18" HDPE WITH 18" FES
(LENGTH INCLUDES FES)
INV IN 4.80, INV OUT 3.73

AT STMH–1A:
8.5'–12" HDPE WITH 12" FES
(LENGTH INCLUDES FES)
INV IN 5.90, INV OUT 4.36

AT STMH–1:
6'–30" HDPE WITH 30" FES
(LENGTH INCLUDES FES)
INV IN 5.80, INV OUT 4.23

NORFOLK & PORTSMOUTH BELTLINE RAILROAD
VARIABLE R/W

VEPCO
℄ 15' UTILITIES
& MAINTENANCE
EASEMENT
D.B. 842, PG. 82

R/W AS DESCRIBED
IN D.B. 291, PG. 90

SWITCH
BEGINS

℄ FROG

SIGNAL
VAULT

BOX

L.P.

P.P.

N71°33'36"E
591.37'

S62°20'06"W
291.98'

FIBER OPTIC
WITNESS POST

IRON ROD
FOUND

℄ RR TRACKS

R/W AS DESCRIBED IN
D.B. 210, PG. 149 (CHESAPEAKE)

D.B. 415, PG. 124
VEPCO TOWER
MAINTENANCE EASEMENT

R=4327.28'

L=235.27'

RAIL DUMP

OUTBOUND SCALE

3" PVC

WELL

CONCRETE
MIXER
FF=12.00

BUILDING
TWO
FF=12.00

BARGE
HOPPER

35'
DOCK

8" SCH 60
PVC @ 0.0%

INV –2.50

PROPOSED
DRY FIRE
HYDRANT

SHIP
MOORING
(TYPICAL)

SHEETPILE
BULKHEAD
TOP 10.50
(BY OTHERS)

CONCRETE
SURFACE

S12°49'56"E
518.69'

SOUTHERN BRANCH OF THE
ELIZABETH RIVER

VIRGINIA STATE PLANE
SOUTH ZONE
NAD 1983

* REMOVE EXISTING VALVE
AND VAULT, PLUG EXISTING
SERVICE LINE

PROPOSED 1.5" WATER
1" WATER METER

PROVIDE 5' WIDE
FLEX. PAVEMENT
PATCH

GV
(FORCE
MAIN)

S71°53'06"W
376.51'

V.V.*

SCALE HOUSE
10'x10'

DI–12A

STMH–12

EDGE OF
PAVEMENT

PROPOSED
PACKAGE
PUMP STATION
AND 2" PVC FM

IRON ROD
FOUND

FL5.9

STMH–1A

NOW OR FORMERLY
DIXON COMPANY
AND DWIGHT A. DIXON
D.B. 1297, PG. 713

REGRADE DITCH
SEE DETAIL, SHT. C7

20'x45'
OFFICE
FF=12.00

6 PARKING
SPACES

32' DIA
DRYER

DUAL
CONTAINER
LOADOUT

SCREENING
TANKS

MAN LIFT

O.W.

INBOUND SCALE

PROPOSED
INFILTRATION
TRENCH

PERMANENT AGGREGATE PILE

70' DUMP

DI–7A

DI–6

TELESCOPIC
CONVEYOR

35.00'

INV –1.30

SHIP
HOPPER

FL5.8

PROVIDE EC–1
FROM ℄ TO RET.
WALL–TYP.

INV.=5.97

HEADWALL

DROP INLET
RIM=7.49
INV.=6.16

12" RCP

STMH–1

GRAVEL

DI–15

DI–14

DI–13

MATCH LINE SEE SHEET C5

DRAINAGE STRUCTURE SCHEDULE

1A. STMH
RIM 10.50
INV 4.36

1. STMH
RIM 10.50
INV 4.23

2. STMH
RIM 10.50
INV 4.04

3. STMH
RIM 10.50
INV 3.73

4. STMH
RIM 8.20
INV (N) 3.50
INV (E) –0.14
INV (W) 2.50

5. STMH
RIM 10.20
INV –0.37

6. DI
RIM 9.40
INV (E) –0.58
INV (W) 1.87
INV (S) 3.41

7. STMH
RIM 10.50
INV –0.86

5A. DI
RIM 9.10
INV 5.09

10A. DI
RIM 9.80
INV 4.25

8. STMH
RIM 10.50
INV –1.05

10. DI
RIM 9.80
INV 4.77

11. DI
RIM 9.80
INV 3.73

12. STMH
RIM 10.40
INV 3.33

12A. DI
RIM 9.50
INV 3.13

13. DI
RIM 9.35
INV 2.49 (E,W,S)
INV 7.29 (N)

14. DI
RIM 9.35
INV 2.96

15. DI
RIM 9.35
INV 3.23

7A. DI
RIM 9.50
INV (N,S) 2.00
INV (E) 4.00

8A. RIM 9.60
INV 3.44

9A. RIM 9.35
INV 4.09

6A. RIM 9.80
INV –0.57

NOTES:
THE SILT SACK PRODUCT SHOWN ON SHEET C7 IS TO BE USED IN ALL STORM DRAIN INLETS AND IS TO REMAIN PERMANENT FOR DRAINAGE STRUCTURES 7A, 8A, 9A, AND 13.

THE INVERTS SHOWN ON THE DROP INLET DENOTES THE INVERT OF THE PIPES. PROVIDE A 12" DEEP SUMP (BELOW THE PIPE INVERT) ON THE DROP INLETS FOR MAINTENANCE PURPOSES FOR STRUCTURES 7A, 8A, 9A, AND 13.

O.W. DENOTES REQUIRED OBSERVATION WELLS; SEE DETAIL ON SHEET C9.

ALL DRAINAGE STRUCTURES ARE TO RECEIVE INLET SHAPING.

SURFACE AREA OF THE SITE WILL BE GRAVEL

COMMONWEALTH OF VIRGINIA
DAVID R. BUTLER
LIC. No.
38395
10/2/13
PROFESSIONAL ENGINEER

0' 30' 60' 90'

GRADING PLAN AND UTILITY PLAN
PORTSMOUTH TERMINAL FACILITY

PROJECT LOCATED IN: VIRGINIA BEACH, VIRGINIA	MADE FOR: PER PROPERTIES
DESIGN BY: BWG · DRAWN BY: JB · CHECKED BY: BWG	DATE: OCTOBER 2, 2013
SCALE: 1" = 30'	SHEET 4/13
FILE NO.: .	C4

GALLUP
SURVEYORS & ENGINEERS, LTD.
323 FIRST COLONIAL ROAD
VIRGINIA BEACH, VIRGINIA 23454
(757)428–8132 (757)425–2390 FAX

MATCH LINE SEE SHEET C4

VEPCO
℄ 15' UTILITIES
& MAINTENANCE
EASEMENT
D.B. 842, PG. 82

DI-11

10.0

FL5.5

STMH-2

10.2

500.00'

N04°13'37"W

4.0'

46.0'

BUILDING
ONE
FF=12.00

36' DIA. TANK
(TYP.)
FG BASE 12.00

O.W.

PROPOSED
INFILTRATION
TRENCH

DI-8A

STMH-7

EX. DITCH

DI-10A

734.53'

PROPOSED
RETAINING
WALL
TW=10.50

36'x100' SHOP
FF=12.00

O.W.

STMH-6A

EXISTING BERM

DI-9A

FL4.8

STMH-3

120.00'

CONC PAD

FL4.6

STMH-5

DI-10

10.2

PROVIDE 3 S.Y.
OF EC-1 STONE
OVER FILTER FABRIC

36" FES

10.5

STMH-4

THE AREA BETWEEN THE PROPOSED BERM AND
THE SOUTHERN BOUNDARY LINE WILL BE FILLED,
BY OTHERS, WITH THE ATLANTIC WOOD SUPERFUND
PROJECT.

FUTURE FINISHED GRADE
CONTOUR-EPA (TYP.)

S85°43'23"W 674.80'

S85°46'23"W 935.45'

ELM AVENUE STATE ROUTE NO. 337 (VARIABLE R/W)

BARGE
HOPPER

STMH-8

INV -1.23

SHEETPILE
BULKHEAD
TOP 10.50
(BY OTHERS)

61'

DI-5A

CONCRETE
SURFACE

SHIP
MOORING
(TYPICAL)

35'
DOCK

SOUTHERN BRANCH OF THE
ELIZABETH RIVER

VIRGINIA STATE PLANE
SOUTH ZONE
NAD 1983

S28°35'13"W

362.05'
S16°36'54"W

8" SCH 60 PVC @ 0.0%

INV -2.50

PROPOSED
DRY FIRE
HYDRANT

107.59'
S16°33'23"W

FUTURE OFFSHORE
SHEET PILE WALL
(BY OTHERS)
TW10.50

0' 30' 60' 90'

COMMONWEALTH OF VIRGINIA
DAVID R. BUTLER
LIC. No.
38395
10/2/13
PROFESSIONAL ENGINEER

GRADING PLAN AND UTILITY PLAN

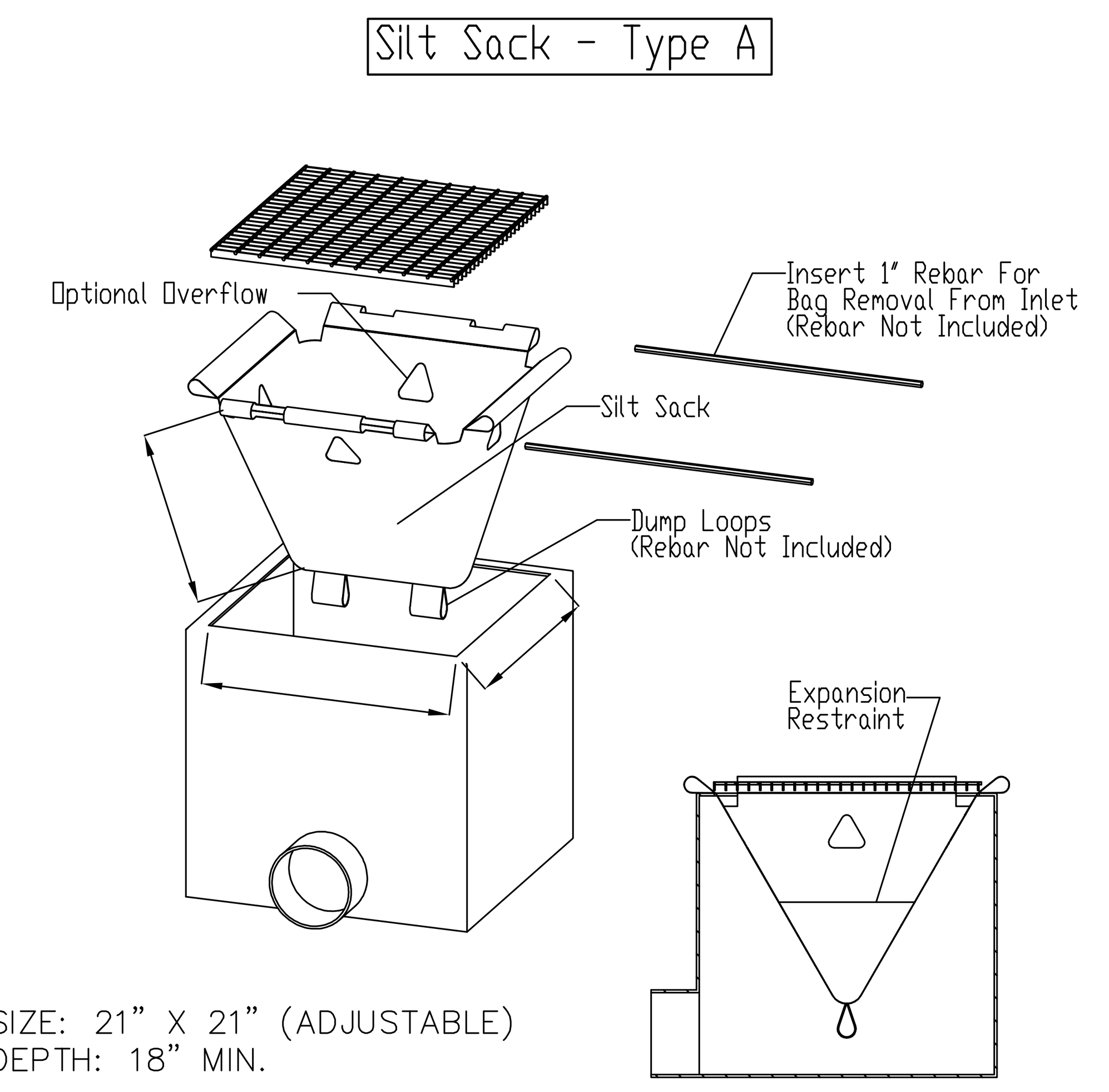
PORTSMOUTH TERMINAL FACILITY

PROJECT LOCATED IN: VIRGINIA BEACH, VIRGINIA	MADE FOR: PER PROPERTIES
DESIGN BY: BWG DRAWN BY: JB CHECKED BY: BWG	DATE: OCTOBER 2, 2013
	SCALE: 1" = 30'
	FILE NO.: .
	SHEET 5/13

GALLUP
SURVEYORS & ENGINEERS, LTD.
323 FIRST COLONIAL ROAD
VIRGINIA BEACH, VIRGINIA 23454
(757)428-8132 (757)425-2390 FAX

C5

Silt Sack - Type A



SIZE: 21" X 21" (ADJUSTABLE)
DEPTH: 18" MIN.
CONFIRM SIZE WITH MANUFACTURER PRIOR TO ORDERING

MAINTENANCE SCHEDULE FOR SILTSACK:

1. EACH SILTSACK SHOULD BE INSPECTED AFTER EVERY MAJOR STORM EVENT
2. IF THERE HAVE BEEN NO MAJOR STORM EVENTS, SILTSACK SHOULD BE INSPECTED EVERY 2-3 WEEKS.
3. THE YELLOW RESTRAINT CORD SHOULD BE VISIBLE AT ALL TIMES. IF THE CORD IS COVERED WITH SEDIMENT, THE SILTSACK SHOULD BE EMPLIED.

SUPPLIER:
ACF ENVIRONMENTAL, INC.
2831 CARDWELL ROAD
RICHMOND, VA. 23234
PH. 800-448-3636

3.0 Construction Sequence

3.1 General

3.1.1 To install Siltsack in the catch basin, remove the grate and place the sack in the opening. Hold approximately six inches of the sack outside the frame. This is the area of the lifting straps. Replace the grate to hold the sack in place.

3.1.2 When the restraint cord is no longer visible, Siltsack is full and should be emptied.

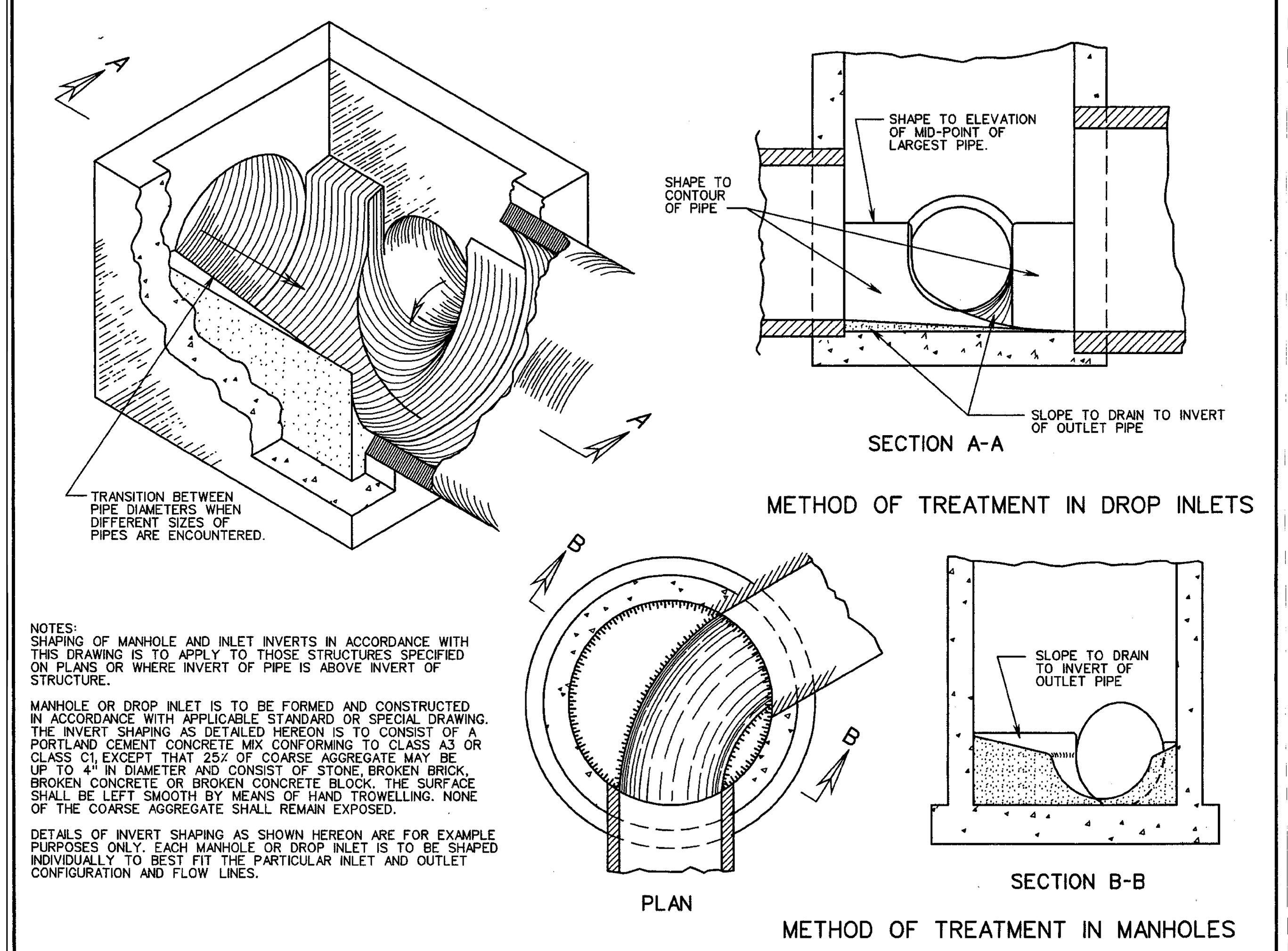
3.1.3 To remove Siltsack, take two pieces of 1" diameter rebar and place through the lifting loops on each side of the sack to facilitate the lifting of Siltsack.

3.1.4 To empty Siltsack, place unit where the contents will be collected. Place the rebar through the lift straps (connected to the bottom of the sack) and lift. This will lift Siltsack from the bottom and empty the contents. Clean out and rinse. Return Siltsack to its original shape and place back in the basin.

3.1.5 Siltsack is reusable. Once the construction cycle is complete, remove Siltsack from the basin and clean. Siltsack should be stored out of sunlight until next use.

SILTSACK DETAIL

THE SILT SACK PRODUCT SHOWN ON THIS SHEET TO BE USED IN ALL STORM DRAIN INLETS AND IS TO REMAIN PERMANENT FOR DRAINAGE STRUCTURES 12-22



NOTES:
SHAPING OF MANHOLE AND INLET INVERTS IN ACCORDANCE WITH THIS DRAWING IS TO APPLY TO THOSE STRUCTURES SPECIFIED ON PLANS OR WHERE INVERT OF PIPE IS ABOVE INVERT OF STRUCTURE.

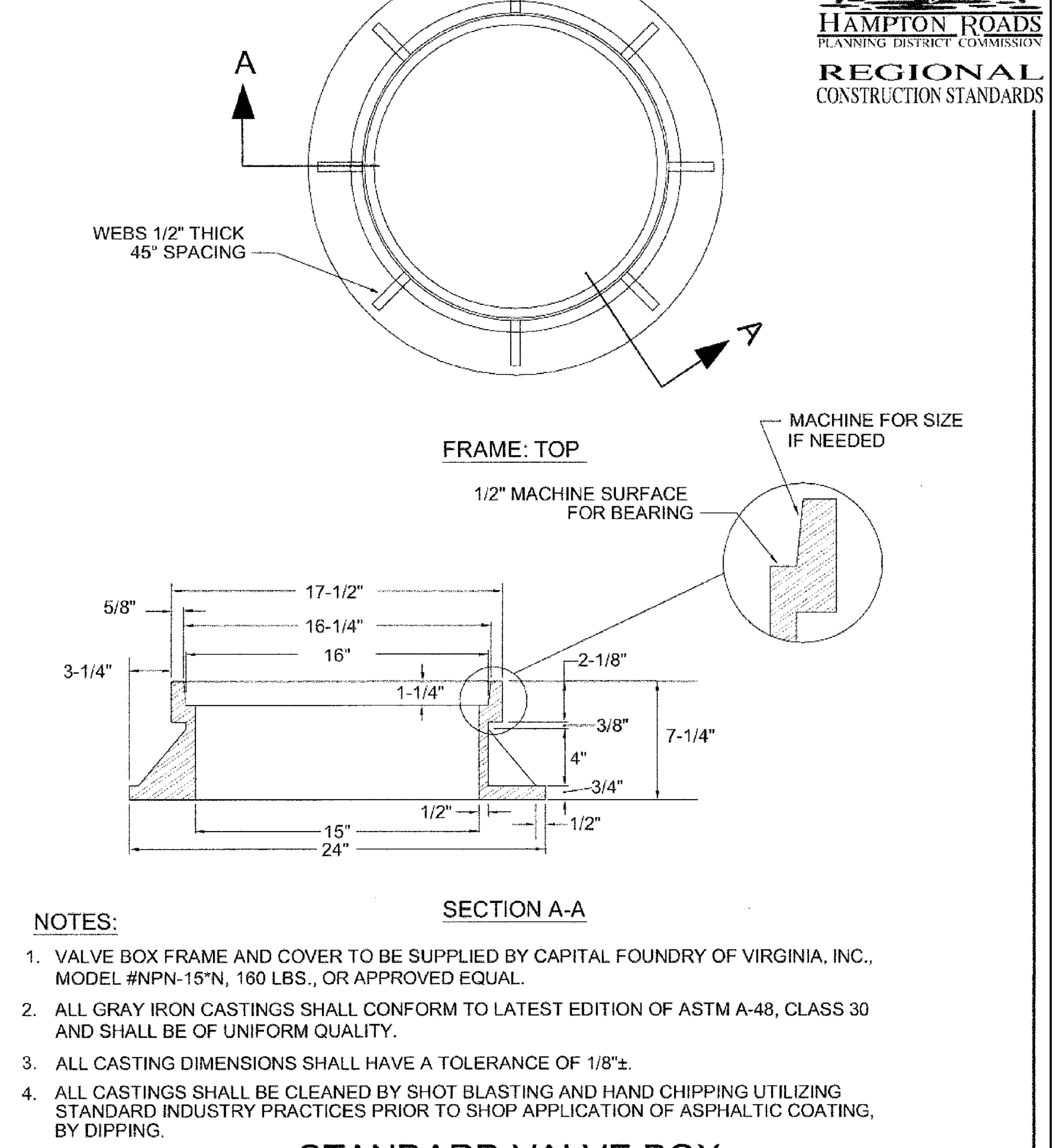
MANHOLE OR DROP INLET IS TO BE FORMED AND CONSTRUCTED IN ACCORDANCE WITH APPLICABLE STANDARD OR SPECIAL DRAWING. THE INVERT SHAPING AS DETAILED HEREON IS TO CONSIST OF A PORTLAND CEMENT CONCRETE MIX CONFORMING TO CLASS A3 OR CLASS C1, EXCEPT THAT 25% OF COARSE AGGREGATE MAY BE UP TO 4" IN DIAMETER AND CONSIST OF STONE, BROKEN BRICK, BROKEN CONCRETE OR BROKEN CONCRETE BLOCK. THE SURFACE SHALL BE LEFT SMOOTH BY MEANS OF HAND TROWELLING. NONE OF THE COARSE AGGREGATE SHALL REMAIN EXPOSED.

DETAILS OF INVERT SHAPING AS SHOWN HEREON ARE FOR EXAMPLE PURPOSES ONLY. EACH MANHOLE OR DROP INLET IS TO BE SHAPED INDIVIDUALLY TO BEST FIT THE PARTICULAR INLET AND OUTLET CONFIGURATION AND FLOW LINES.

VDOT ROAD AND BRIDGE STANDARDS	STANDARD METHOD OF SHAPING MANHOLE & INLET INVERTS — VIRGINIA DEPARTMENT OF TRANSPORTATION	SPECIFICATION REFERENCE
SHEET 1 OF 1 / REVISION DATE / 106.08		302

ALL DRAINAGE STRUCTURES ARE TO RECEIVE INLET SHAPING WITH THE EXCEPTION OF STRUCTURES 12-22.

HAMPTON ROADS PLANNING DISTRICT COMMISSION
REGIONAL CONSTRUCTION STANDARDS



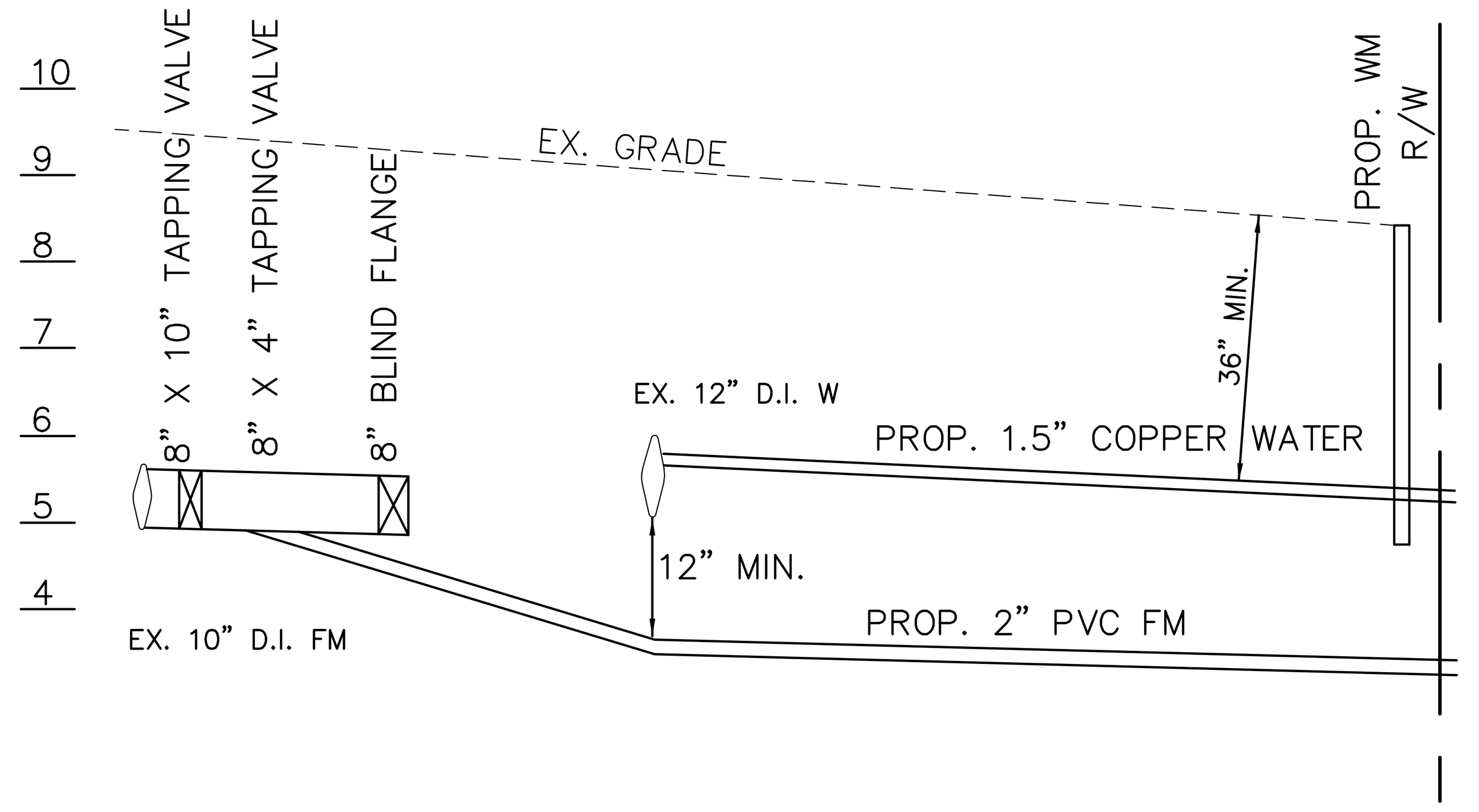
NOTES:

1. VALVE BOX FRAME AND COVER TO BE SUPPLIED BY CAPITAL FOUNDRY OF VIRGINIA, INC., MODEL #NPN-15"N, 160 LBS., OR APPROVED EQUAL.
2. ALL GRAY IRON CASTINGS SHALL CONFORM TO LATEST EDITION OF ASTM A-48, CLASS 30 AND SHALL BE OF UNIFORM QUALITY.
3. ALL CASTING DIMENSIONS SHALL HAVE A TOLERANCE OF 1/8"±.
4. ALL CASTINGS SHALL BE CLEANED BY SHOT BLASTING AND HAND CHIPPING UTILIZING STANDARD INDUSTRY PRACTICES PRIOR TO SHOP APPLICATION OF ASPHALTIC COATING, BY DIPPING.

STANDARD VALVE BOX FRAME AND COVER

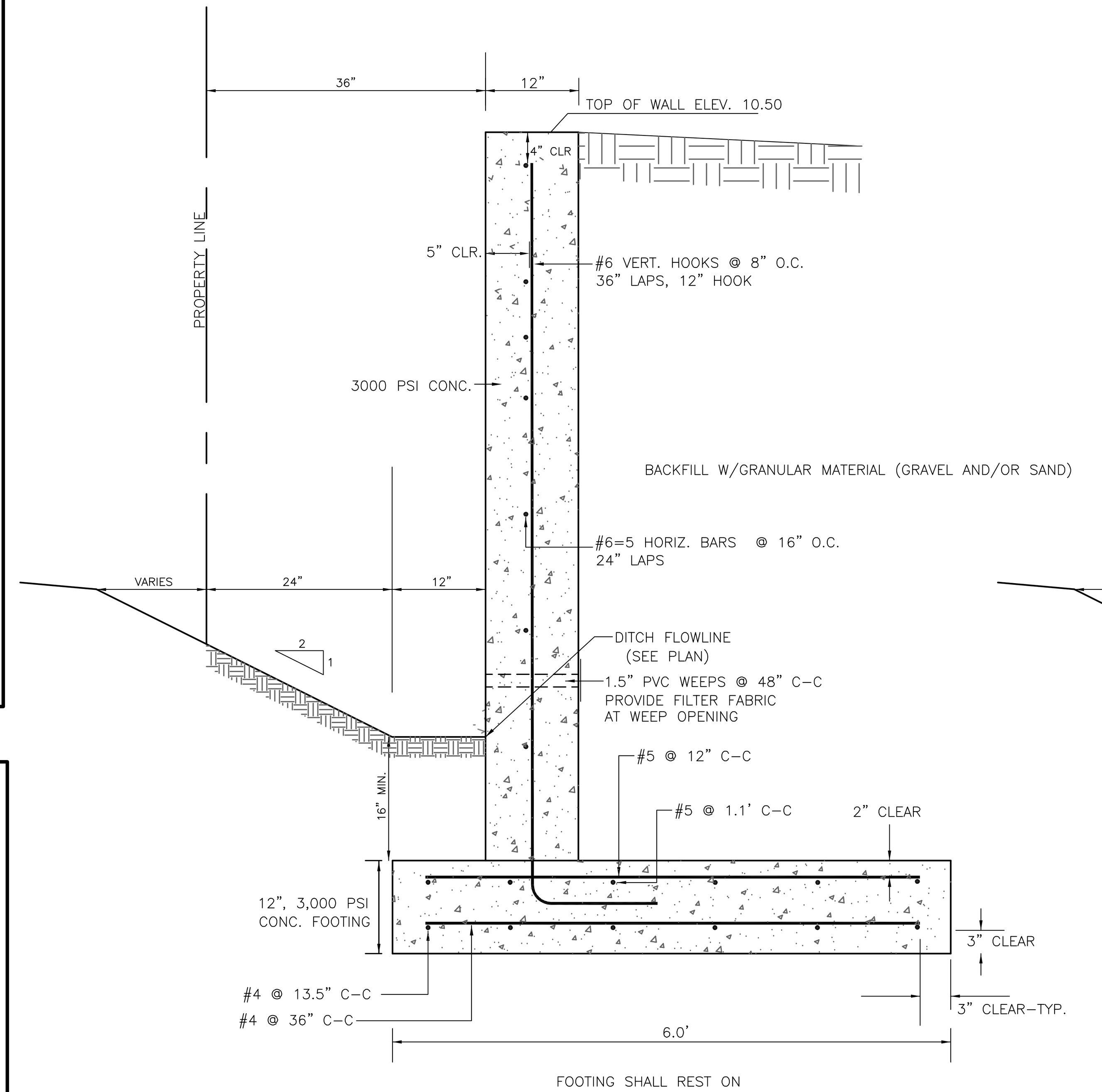
NOT TO SCALE

REFERENCE	CATEGORY	DATE	SHEET NO.	DETAIL NO.
200,801,803	WATER & SANITARY	12/10	2 OF 2	WS_01

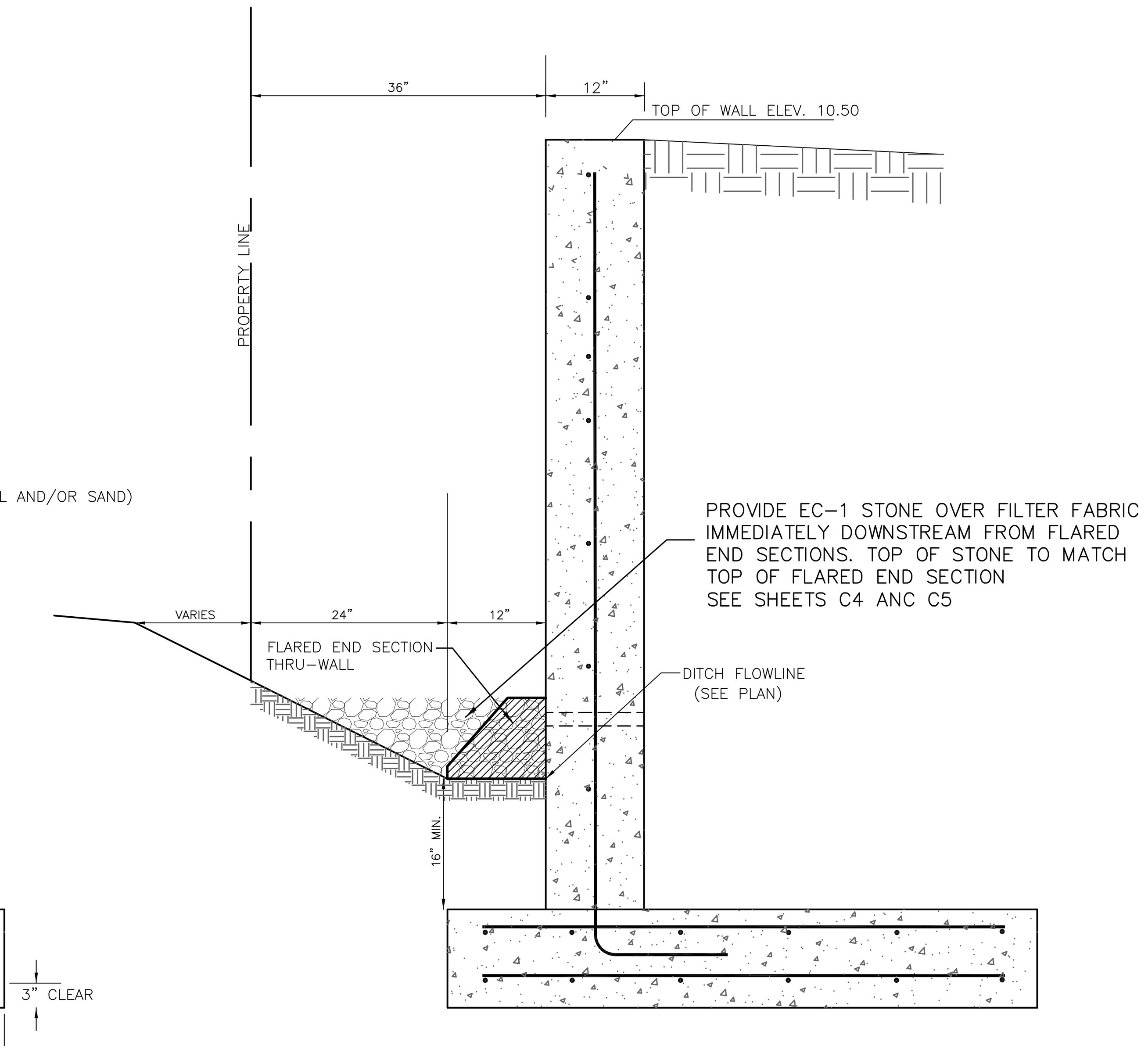


PROFILE:
FM AND WATER SERVICE CONNECTION

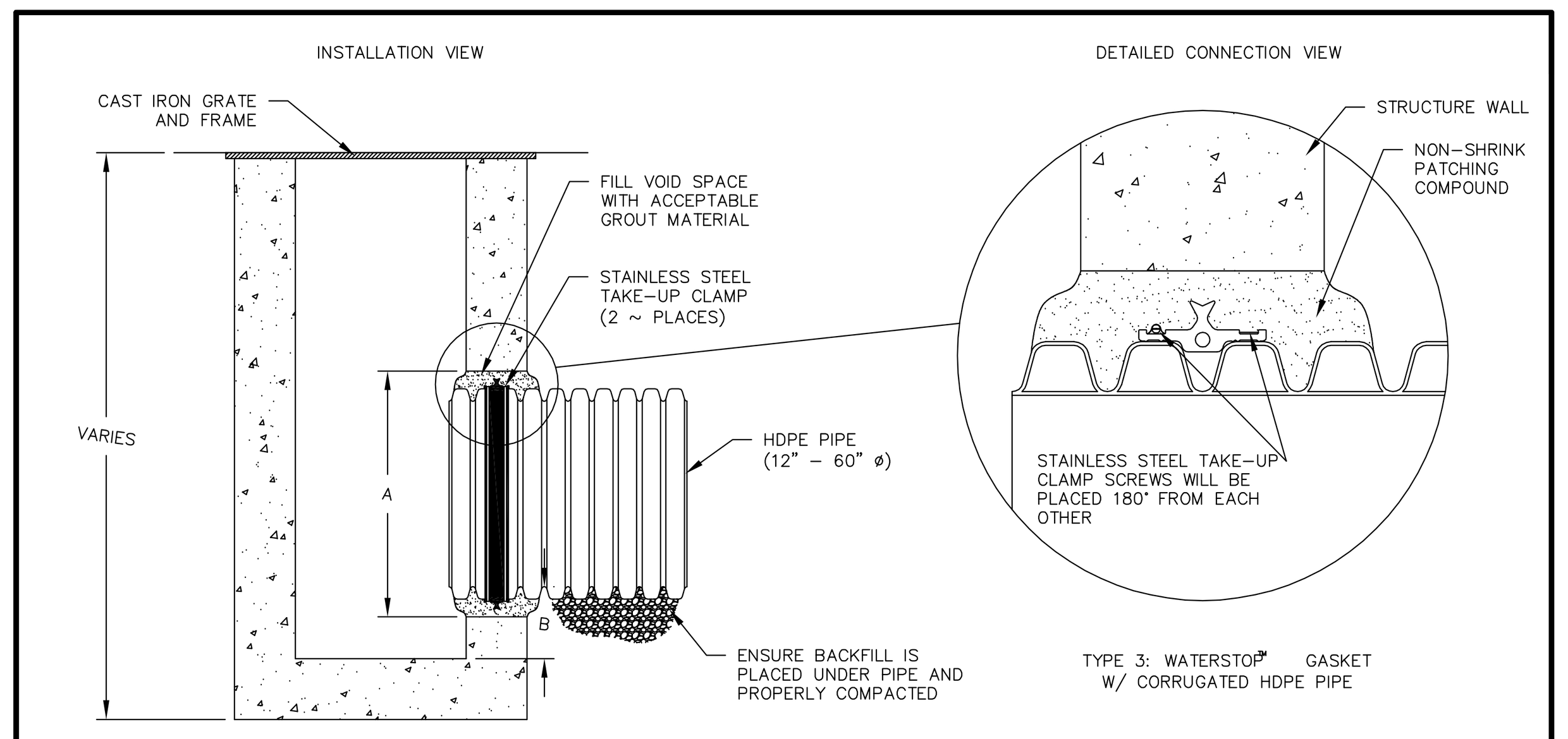
SCALE: 1" = 2' HORIZ.
1" = 2' VERT.



TYPICAL SECTION ALONG WEST PROPERTY LINE
(NO SCALE)



TYPICAL SECTION ALONG WEST PROPERTY LINE @ STMH 1, 1A, 2, 3
(NO SCALE)



INSTALLATION RECOMMENDATIONS ARE ALSO SPECIFIED IN INSTALLATION GUIDE 1.05: WATERSTOP INSTALLATION

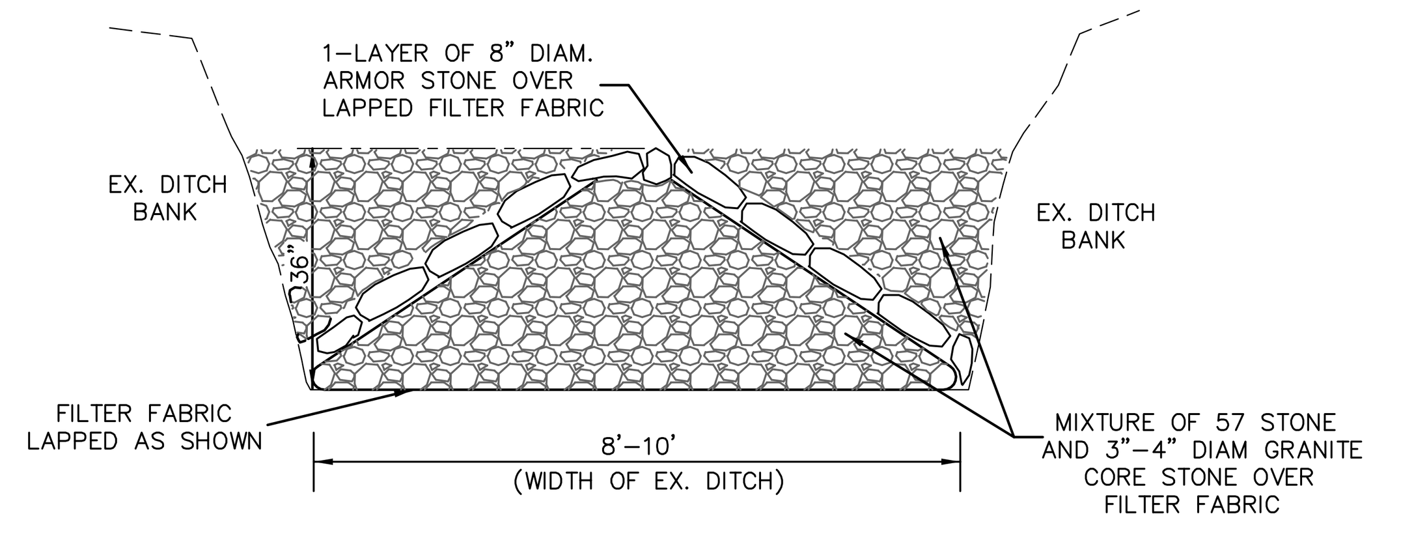
PIPE SIZE (IN)	PIPE OD (IN) A-PROFILE	PIPE OD (IN) H-PROFILE	"A" MIN. HOLE ø (IN)	"B" MIN. DISTANCE PIPE INVERT TO STRUCUTRE INVERT (IN)	MANUFACTURER'S PRODUCT CODE
12	14.5	14.2	19.50	3.7	1202PS
15	17.6	17.8	23.00	4.0	1502PS
18	21.2	21.5	26.50	4.2	1802PS
24	27.8	28.4	33.25	4.5	2402PS
30	35.1	35.5	40.50	5.2	3002PS
36	41.1	41.4	47.00	5.5	3602PS
42	47.7	48.0	53.00	5.7	4202PS
48	53.6	54.0	59.00	5.7	4802PS
60	66.3	67.3	72.00	6.4	6002PS

ADVANCED DRAINAGE SYSTEMS, INC. ("ADS") HAS PREPARED THIS DETAIL BASED ON INFORMATION PROVIDED TO ADS. THIS DRAWING IS INTENDED TO DEPICT THE COMPONENTS AS REQUESTED. ADS HAS NOT PERFORMED ANY ENGINEERING OR DESIGN SERVICES FOR THIS PROJECT, NOR HAS ADS INDEPENDENTLY VERIFIED THE INFORMATION SUPPLIED. THE INSTALLATION DETAILS PROVIDED HEREIN ARE GENERAL RECOMMENDATIONS AND ARE NOT SPECIFIC FOR THIS PROJECT. THE DESIGN ENGINEER SHALL REVIEW THESE DETAILS PRIOR TO CONSTRUCTION. IT IS THE DESIGN ENGINEERS RESPONSIBILITY TO ENSURE THE DETAILS PROVIDED HEREIN MEETS OR EXCEEDS THE APPLICABLE NATIONAL, STATE, OR LOCAL REQUIREMENTS AND TO ENSURE THAT THE DETAILS PROVIDED HEREIN ARE ACCEPTABLE FOR THIS PROJECT.

WATERSTOP STRUCTURE CONNECTION DETAIL
(NO SCALE)

ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OHIO 43026

DRAWN BY: ABC | DATE: DATE | CK'D BY: ENG | SCALE: NTS | SHEET: OF



DETAIL

CHECK DAM AT SW CORNER OF BOUNDARY
(NO SCALE)

COMMONWEALTH OF VIRGINIA
DAVID R. BUTLER
Lic. No. 38395
10-2-13
PROFESSIONAL ENGINEER

DATE	COMMENT
REVISION SCHEDULE	

DETAILS AND NOTES

PORTSMOUTH TERMINAL FACILITY

PROJECT LOCATED IN: VIRGINIA BEACH, VIRGINIA			MADE FOR: PER PROPERTIES	
DESIGN BY: DRB	DRAWN BY: JB	CHECKED BY: DRB	DATE: OCTOBER 2, 2013	
GALLUP SURVEYORS & ENGINEERS, LTD. 323 FIRST COLONIAL ROAD VIRGINIA BEACH, VIRGINIA 23454 (757)428-8132 (757)425-2390 FAX			SCALE: N/A / FILE NO.: .	SHEET 9/13 C7

G:\10-32 Salmon Portsmouth\10-32-5 e & s.dwg, 11/11/2013 11:35:25 AM, 1:60, DB

DRAINAGE STRUCTURE SCHEDULE

1A. STMH
RIM 10.50
INV 4.37

1. STMH
RIM 10.50
INV 4.24

2. STMH
RIM 10.50
INV 4.04

3. STMH
RIM 10.50
INV 3.73

4. STMH
RIM 8.20
INV (N) 3.51
INV (E) −0.14
INV (W) 2.50

5. STMH
RIM 10.20
INV −0.37

6. DI
RIM 9.40
INV (E) −0.58
INV (W) 1.87
INV (S) 3.41

7. STMH
RIM 10.50
INV −0.86

5A. DI
RIM 9.10
INV 5.09

10A. DI
RIM 9.80
INV 4.25

8. STMH
RIM 10.50
INV −1.05

10. DI
RIM 9.80
INV 4.77

11. DI
RIM 9.80
INV 3.73

12. STMH
RIM 10.40
INV 3.33

12A. DI
RIM 9.50
INV 3.13

13. DI
RIM 9.35
INV 2.49 (E,W,S)
INV 7.29 (N)

14. DI
RIM 9.35
INV 2.96

15. DI
RIM 9.35
INV 3.23

7A. DI
RIM 9.50
INV (N,S) 2.00
INV (E) 4.00

8A. RIM 9.60
INV 3.44

9A. RIM 9.35
INV 4.09

6A. RIM 9.80
INV −0.57

10−10A
208'−24" HDPE @ 0.25%
INV IN 4.77, INV OUT 4.25

10A−11
207'−24" HDPE @ 0.25%
INV IN 4.25, INV OUT 3.73

11−12
198'−24" HDPE @ 0.20%
INV IN 3.73, INV OUT 3.33

12−12A
59'−24" HDPE @ 0.34%
INV IN 3.33, INV OUT 3.13

12A−13
191'−24" HDPE @ 0.34%
INV IN 3.13, INV OUT 2.49

RR−13
117'−12" HDPE @ 1.03%
INV IN 8.50, INV OUT 7.29

9A−8A
109'−18" PERFORATED HDPE @ 0.60%
INV IN 4.09, INV OUT 3.44

15−14
89'−18" HDPE @ 0.30%
INV IN 3.23, INV OUT 2.96

14−13
196'−24" HDPE @ 0.24%
INV IN 2.96, INV OUT 2.49

13−7A
215'−18" PERFORATED HDPE @ 0.23%
INV IN 2.49, INV OUT 2.00

7A−6
344'−36" CL. IV RCP @ 0.62%
INV IN 4.00, INV OUT 1.87

8A−7A
215'−24" CL. IV RCP @ 0.67%
INV IN 3.44, INV OUT 2.00

5A−6
330'−15" HDPE @ 0.51%
INV IN 5.09, INV OUT 3.41

6−OUTLET
144' 42" HDPE @ 0.50%
INV IN −0.58, INV OUT −1.30
PROVIDE TIDEFLEX TF−1
ON OUTLET END

NOTES:
THE SILT SACK PRODUCT SHOWN ON SHEET C7 IS TO BE USED IN ALL STORM DRAIN INLETS AND IS TO REMAIN PERMANENT FOR DRAINAGE STRUCTURES 7A, 8A, 9A, AND 13.

THE INVERTS SHOWN ON THE DROP INLET DENOTES THE INVERT OF THE PIPES. PROVIDE A 12" DEEP SUMP (BELOW THE PIPE INVERT) ON THE DROP INLETS FOR MAINTENANCE PURPOSES FOR STRUCTURES 7A, 8A, 9A, AND 13.

O.W. DENOTES REQUIRED OBSERVATION WELLS; SEE DETAIL ON SHEET C9.

ALL DRAINAGE STRUCTURES ARE TO RECEIVE INLET SHAPING.

FINAL SURFACE WILL BE GRAVEL AND CRUSHED CONCRETE

PIPE SCHEDULE

4−5
150'−36" HDPE @ 0.15%
INV IN −0.14, INV OUT −0.37

5−6A
154'−36" HDPE @ 0.13%
INV IN −0.37, INV OUT −0.57

6A−7
220'−36" HDPE @ 0.13%
INV IN −0.57, INV OUT −0.86

7−8
158'−36" HDPE @ 0.12%
INV IN −0.86, INV OUT −1.05

8−OUTLET
152'−36" HDPE @ 0.12%
INV IN −1.05, INV OUT −1.23
PROVIDE TIDEFLEX TF−1
ON OUTLET END

1A−1
134'−12" HDPE @ 0.10%
INV IN 4.36, INV OUT 4.23

1−2
119'−30" HDPE @ 0.17%
INV IN 4.23, INV OUT 4.04

2−3
204'−30" HDPE @ 0.15%
INV IN 4.04, INV OUT 3.73

3−4
156'−30" HDPE @ 0.15%
INV IN 3.73, INV OUT 3.50

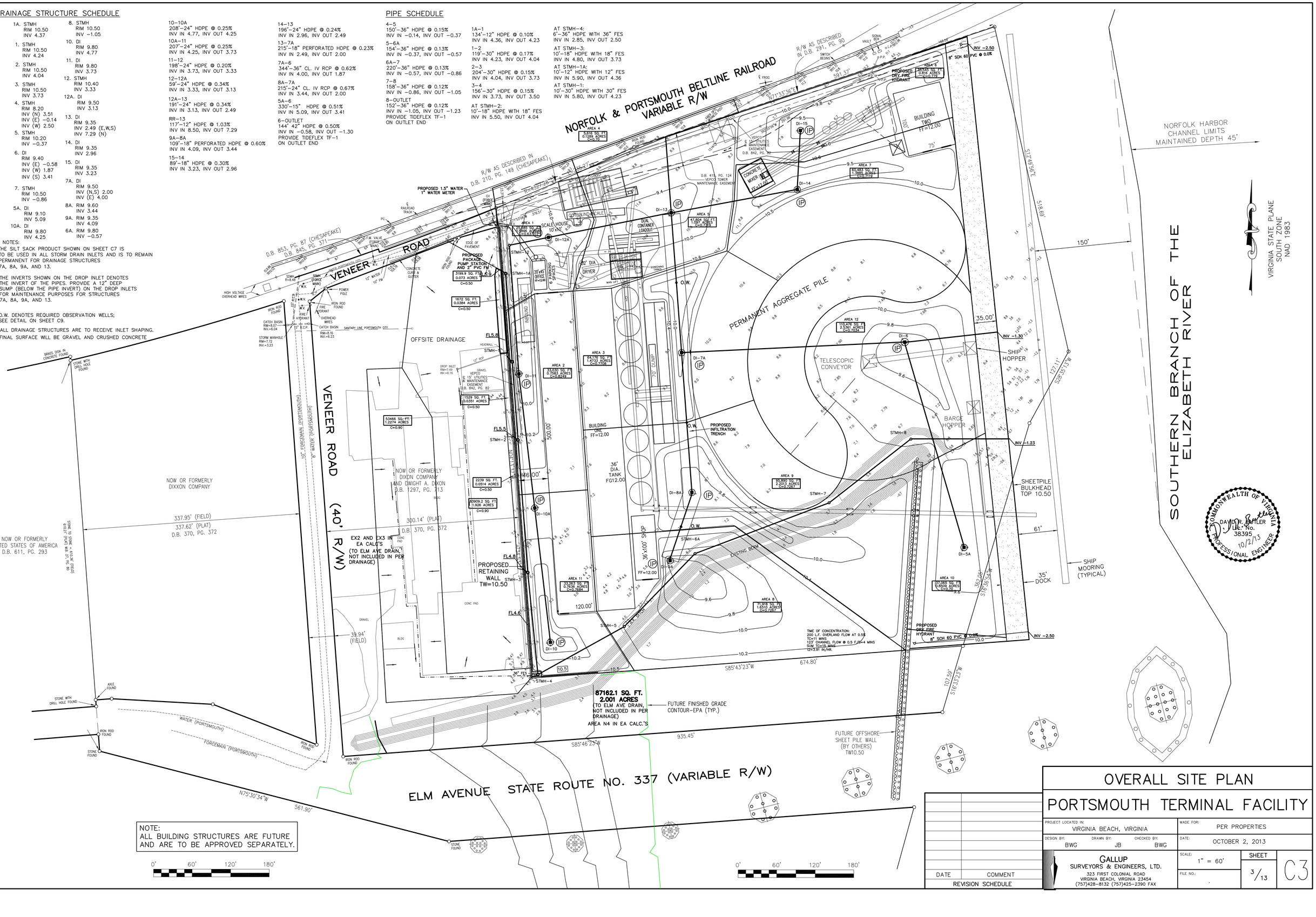
AT STMH−2:
10'−18" HDPE WITH 18" FES
INV IN 5.50, INV OUT 4.04

AT STMH−4:
6'−36" HDPE WITH 36" FES
INV IN 2.85, INV OUT 2.50

AT STMH−3:
10'−18" HDPE WITH 18" FES
INV IN 4.80, INV OUT 3.73

AT STMH−1A:
10'−12" HDPE WITH 12" FES
INV IN 5.90, INV OUT 4.36

AT STMH−1:
10'−30" HDPE WITH 30" FES
INV IN 5.80, INV OUT 4.23



NOTE:
ALL BUILDING STRUCTURES ARE FUTURE AND ARE TO BE APPROVED SEPARATELY.

0' 60' 120' 180'

0' 60' 120' 180'

DATE	COMMENT

REVISION SCHEDULE

OVERALL SITE PLAN

PORTSMOUTH TERMINAL FACILITY

PROJECT LOCATED IN: VIRGINIA BEACH, VIRGINIA

MADE FOR: PER PROPERTIES

DESIGN BY: BWG DRAWN BY: JB CHECKED BY: BWG

DATE: OCTOBER 2, 2013

SCALE: 1" = 60'

SHEET 3/13 C3

FILE NO.: .

GALLUP
SURVEYORS & ENGINEERS, LTD.
323 FIRST COLONIAL ROAD
VIRGINIA BEACH, VIRGINIA 23454
(757)428−8132 (757)425−2390 FAX

COMMONWEALTH OF VIRGINIA
DAVID R. BUTLER
LIC. No. 38395
10/2/13
PROFESSIONAL ENGINEER

G:\10-32 Salmon Portsmouth\10-32-5 e & s.dwg, 10/19/2013 11:56:28 AM, 1:60, DB

DRAINAGE CALCULATIONS
FOR PER, LOCATED IN
CITY OF PORTSMOUTH
REVISED AUGUST 2013

AREA SUMMARY:

C FACTOR FOR ROOF AND CONCRETE=0.90
C FACTOR FOR GRAVEL=0.70
C FACTOR FOR GRASS=0.30

AREA 1:
A TOTAL=25,685 SQ. FT. = 0.5896 AC.
3588 S.F.=0.0823 AC. X 0.9 = CA=0.0741
5794 S.F. = 0.1330 AC. X 0.3 = CA=.0399
16303 S.F.=0.3743 AC X 0.70 = CA=0.2691
SUM CA'S=0.3760, C=0.6377

AREA 2:
A TOTAL=33030 S.F.=0.7583 AC.
20626 S.F.=0.4735 AC X 0.90=0.4262
12404 S.F.=0.2848 A. X 0.70=0.1993
SUM CA=0.6255, C=0.8249

AREA 3:
64176 S.F.=1.4733 AC.
22740 S.F.=0.5220 AC. X 0.9=0.4688
41436 S.F.=0.9512 AC. X 0.7=0.6659
SUM CA=1.1357, C=0.7708

AREA 4 TO STUB:
5616 S.F. = 0.1289 X 0.70=0.0902

AREA 5:
A TOTAL = 47804 S.F. = 1.0974 AC.
7635 S.F.=0.1753 AC. X 0.9=0.1577
40,169 S.F. = 0.9222 AC. X 0.7=0.6455
SUM CA=0.8032, C=0.7319

AREA 6:
AREA TOTAL=35,545 S.F.=0.816 AC.
14029 S.F. = 0.3221 AC. X 0.9=0.2899
21516 S.F.=0.494 AC. X 0.7=0.3457
SUM CA=0.6357, C=0.779

AREA 7:
AREA TOTAL=60,483 S.F.=1.3885 AC.
3604 S.F. = 0.0827 X 0.9=.0745
56,879 S.F.=1.3058 AC. X 0.7=0.914
SUM CA=0.9885, C=0.7119

AREA 8:
AREA TOTAL=71818 S.F.=1.6510 AC.
9608 S.F.=0.2206 AC. X 0.90=0.1985
62310 S.F.=1.4304 AC. X 0.7=1.0013
SUM CA=1.1998, C=0.7267

AREA 9:
AREA TOTAL=95,890 S.F.=2.2013 AC.
14484 S.F.=0.3325 AC. X 0.9=0.2993
81406 S.F.=1.8688 AC. X 0.7=1.3082
SUM CA=1.6075, C=0.73

AREA 10:
37065 S.F.=0.8509 AC.
C=0.7, CA=0.5956

AREA 11:
AREA TOTAL=33263 S.F.=0.7636 AC.
11374 S.F.=0.2611 AC. X 0.9=0.235
21889 S.F.=0.5025 AC. X 0.7=0.3518
SUM CA=0.5867, C=0.7684

AREA 12:
AREA TOTAL=110476 S.F.=2.5361 AC.
1903 S.F.=0.0436 X 0.9=0.0393
108573 S.F.=2.4924 AC. X 0.7=1.7447
SUM CA=1.7841, C=0.7034

OFFSITE AREAS FROM DIXON TRACT:

TO STMH-1A
AREA TOTAL=3199 S.F.=0.0735 AC.
3199 S.F.=0.0735 AC. X 0.5=0.0368

TO STMH-1
AREA TOTAL=85581 S.F.=1.9646 AC.
1672 S.F.=0.0384 AC. X 0.5=0.0192
83909 S.F. = 1.9262 AC. X 0.90=1.7337
SUM CA=1.7529, C=0.8922

TO STMH-2
AREA TOTAL=1529 S.F.=0.0351 AC. X 0.5=.0175

TO STMH-3
AREA TOTAL=2239 S.F.=0.0514 AC. X 0.5=.0257

TO STMH-4
AREA TOTAL=53466 S.F.=1.2274 AC. X 0.9=1.1047

C FACTORS FOR THE DIXON TRACT ASSUME ULTIMATE DEVELOPMENT:

SUM OF THE OFFSITE AREAS=146,014 S.F. = 3.352 AC.
SUM OF THE OFFSITE CA's=2.93755
ULTIMATE C FACTOR = 2.9376/3.3520 = 0.88

OFFSITE STORM SEWER IS DESIGNED WITH THE DIXON TRACT BEING ULTIMATELY DEVELOPED, NOT THE CURRENT STATE (CONSERVATIVE)

NOTES:
ONSITE AND OFFSITE DRAINAGE DESIGNED FOR THE 100 YEAR STORM. BOTH SYSTEMS ARE INDEPENDENT AND SEPARATE. WATER QUALITY STORAGE CALCULATIONS WERE PERFORMED BASED ON ONE INCH OF RUNOFF OVER THE IMPERVIOUS AREAS WITHIN THE REQUIRED DRAINAGE AREA. PEAK RUNOFF WILL BE REDUCED SOMEWHAT BECAUSE OF INFILTRATION WITH THE BMP TRENCH, BUT WAS NOT CONSIDERED IN THE STORM DRAIN DESIGN.

WATER QUALITY CALCULATIONS FOR INFILTRATION TRENCH

AREA 8:
TOTAL AREA=1.651 AC.
ROOF A=0.2206 AC.
GRAVEL AREA=1.4304 AC, 70% IMPERVIOUS=1.0013 AC.
SUM=1.2219 AC.

AREA 9:
TOTAL AREA=2.2013 AC.
ROOF A=0.3325 AC.
GRAVEL AREA =1.8688 AC., 70% IMPERVIOUS = 1.3082 AC.
SUM=1.6407 AC.

AREA 3:
TOTAL AREA=1.4733 AC.
ROOF A=0.522 AC.
GRAVEL AREA=0.9512 AC.. 70% IMPERVIOUS=0.6659 AC.
SUM=1.1879 AC.

AREA 11:
TOTAL AREA=0.7636 AC.
ROOF A=0.2611 AC.
GRAVEL AREA=0.5025 AC, 70% IMPERVIOUS=0.3518
SUM=0.6129 AC.

AREA 2:
TOTAL AREA=0.7583 AC.
ROOF A=0.4735 AC.
GRAVEL A=0.2847 AC, 70% IMPERVIOUS = 0.1993 AC.
SUM=0.6728 AC.

AREA 5:
TOTAL A=1.0974 AC.
ROOF A=0.1753 AC.
GRAVEL A=0.9222 AC., 70% IMPERVIOUS = 0.6455 AC.
SUM=0.8208

AREA 1:
TOTAL AREA=0.5896 AC.
ROOF A=0.0823 AC.
GRAVEL A=0.3743 AC, 70% IMPERVIOUS=0.2619 AC.
SUM=0.3442 AC.

SUM OF THE AREAS=8.5344 AC.
SUM OF THE IMPERVIOUS AREAS=6.5012 AC.
I% = 6.5012 AC./8.5344 AC. = 76.2%

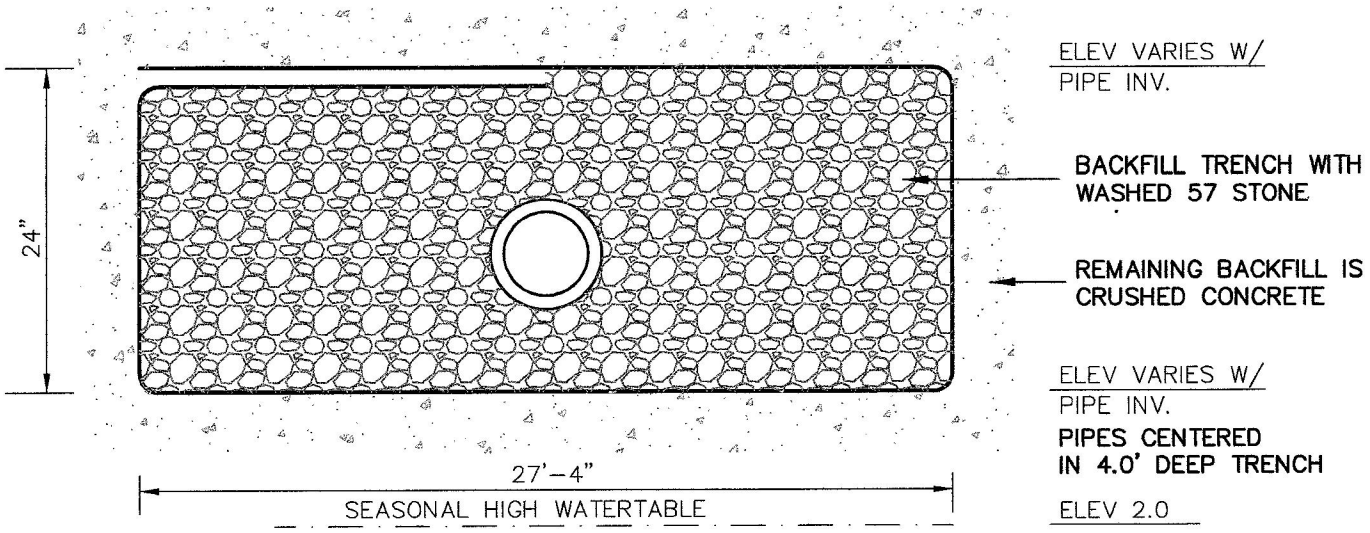
REQUIRED VOLUME IS 1" X WATER QUALITY VOLUME:
(0.5"/12)(6.5012 AC.) (43,560 S.F./AC.) = 11,799 CUBIC FEET

TRENCH INSTALLED BETWEEN 13 AND 9A:
LENGTH=544 L.F.
DEPTH OF 57 STONE=4'
WIDTH OF TRENCH=13.67'
VOID VOLUME IS 40% OF TOATL VOLUME
VOLUME PROVIDED IN VOIDS=(544')(4')(13.67')(0.4) = 11,898 C.F. > 11,799 C.F.

BMP AREA FOR TABLE ON COVER SHEET:
838.8' X 4' DEEP X 2 SIDES = 4,310 S.F.
27.3' WIDE X 4' DEEP X 2 SIDES = 55 S.F.
1,143 S.F. BOTTOM AREA
TOTAL=5,508 S.F.

FROM BMP CLEARINGHOUSE:
INFILTRATION PRACTICE NUMBER 8, TOTAL MASS LOAD REMOVAL OF TOTAL PHOSPHORUS = 50%

APPLICABLE AREA=14.87 ACRES
I WATERSHED FOR PORTSMOUTH=54%
EXISTING IMPERVIOUS AREA=1.15 ACRES
USE SITUATION 2, PERFORMANCE BASED WATER QUALITY CALCULATIONS
I EX.< I WATERSHED
I POST> I WATERSHED
L PRE (WS) = (0.05+(0.009 X 54))X 14.87 AC. X 2.28=18.2 LBS/YEAR
L POST = (0.05 + (0.009 X 76.6)) X 14.87 X 2.28 = 25.06 LBS/YR.
RR=LPOST − LPRE
RR=25.06−18.2=6.9 LBS/YR.
USING INFILTRATION,
L BMP = (0.05 + (0.009 X 76.2)) X 8.5344 X 2.28 = 14.31 LBS/YR.
L REMOVED BY BMP=0.50 X 14.31 = 7.15 LBS/YR
7.2 LBS/YR > 6.9 LBS/YR
WATER QUALITY IS SATISFIED.



TRENCH LENGTH=544 L.F.
IINFILTRATION RATE (I)=0.0000713 F/S
VOLUME=L x W x D x 0.4
VOID VOLUME = 40% OF TRENCH VOLUME
Q OUT=I x TOTAL TRENCH AREA

VOID RATIO OF 57 STONE: 0.40
VOID VOLUME OF CRUSHED CONCRETE: 0.30−0.40

TRENCH INSTALLED BETWEEN 13 AND 9A:
LENGTH=544 L.F.
DEPTH OF 57 STONE=2'
WIDTH OF TRENCH=27.34'
VOID VOLUME IS 40% OF TOTAL VOLUME
VOLUME PROVIDED IN VOIDS=(544')(2')(27.34')(0.4) = 11,898 C.F. > 11,799 C.F.

TRENCH AREA: (2' X 544' X 2 SIDES) + (27.34' X 544' X 2) = 31,922 S.F.
0.0000713 F/S X 31,922 S.F. = 2.28 CFS
Q IS REDUCED BY 1.37 CFS

2 YEAR STORM VOLUME FROM HYDROGRAPH=40,561 C.F.
Q OUT=0.0000713 C.F/S PER S.F. X 31,922 S.F. = 2.276 CF/SEC
40,561 C.F./2.276 CFS = 17,821 SEC X 1 MIN/60S X 1 HR./60 MIN X 1 DAY/24 HOURS = 0.21 DAYS
2 YEAR STORM WILL EXFILTRATE IN 0.21 DAYS

INLET CAPACITY CALCULATIONS

CALCULATIONS PERFORMED USING VDOT GRATE INLET CAPACITY CHART

WIDTH OF STANDARD DROP INLET = 2.17, LENGTH = 2.17'
EQUATION FOR CHART NOMOGRAPH: P=2(W+L);
FOR SINGLE INLET, P=2(2.17'+2.17')=8.68

DI-10
Q100=5.63 CFS
DEPTH AT INLET=0.38'
ELEVATION AT INLET=RIM ELEVATION + DEPTH = 9.80+0.38'=10.18'<10.5
STORM IS CONTAINED

DI-11
Q=0.7583 X 0.8249
TC=5 MINS.
I100 = 9.60 IN/HR
Q100=6.01 CFS
DEPTH=0.39'
ELEV.=0.39'+9.80=10.19 < 100.50

DI-12
TC=10 MINS
I100=8.21
Q100 = 0.5896 X 0.6377 X 8.21 = 3.1 CFS
DEPTH AT INLET=0.24'
ELEVATION = 0.24'+9.50=9.74' < 10.5

DI-13
T=10 MINS
I100=8.21
Q100=1.0974 X 0.7319 X 8.21 = 6.6 CFS
DEPTH AT INLET = 0.41'
ELEVATION = 0.41'+9.35=9.76 < 10.5

DI-14
TC=5 MINS
I100=9.60
Q100=1.3885 X 0.7119 X 9.60 = 9.5 CFS
DEPTH AT INLET = 0.52'
ELEVATION = 0.52'+9.35 = 9.87' < 10.5

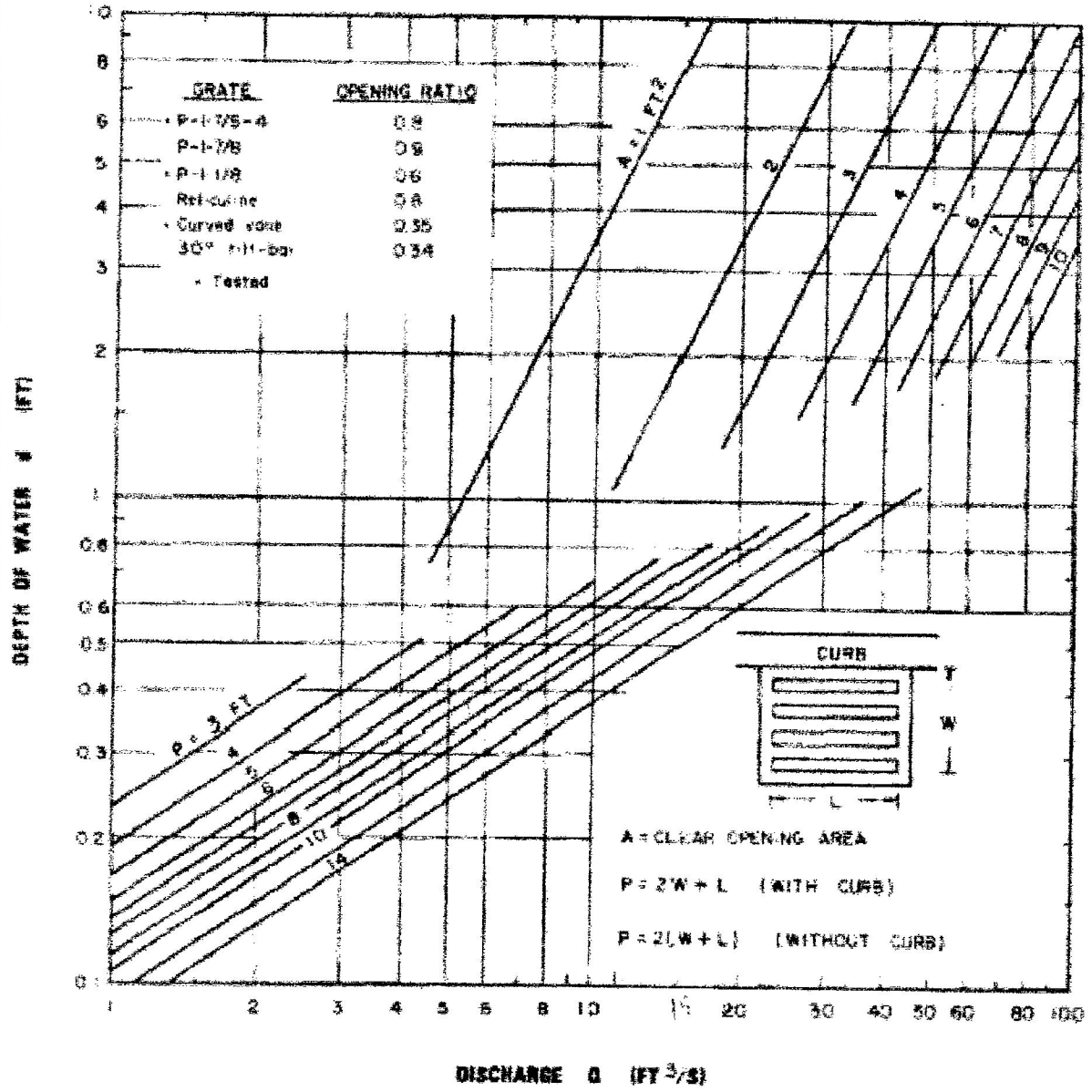
DI-15
TC=5 MINS
I100=9.60
Q100=0.816 X 0.779 X 9.60 = 6.1 CFS
DEPTH AT INLET=0.39'
ELEVATION=0.39'+9.35 = 9.74 < 10.5

DI-8A
TC=15.32 MIN
I100=7.13
Q100=2.2013 X 0.73 X 7.13 = 11.5 CFS
DEPTH AT INLET=0.59'
ELEVATION=0.59'+9.60 = 10.19' < 10.5

DI-7A
TC=5 MINS
I100=9.60
Q100=1.4733 X 0.7708 X 9.60 = 10.9 CFS
DEPTH AT INLET = 0.57'
ELEVATION=0.67'+9.50 = 10.17 < 10.5

endix 9C-12

Grate Inlet Capacity in Sump Conditions



Grate Inlet Capacity in Sump Conditions - English Units

FOR HGL CALC'S, THE STARTING HW ELEV.
USED IS MHW (NAV. 88), ELEV=1.10
AT EACH UPSTREAM INLET, BEGINING TW ELEV.
IS EITHER LAST HGL ELEV, DEPTH IN PIPE
CONVERTED TO ELEV, OR CRITICAL DEPTH
CONVERTED TO ELEV. IN ALL CASES, THE LAST HGL
ELEV IS THE CONTROL.

CHECK CONTROL FOR OFFSITE HGL CALC'S:

DEPTH IN PIPE AT NO. 8 USING 24.87 CFS, S=0.0012 = 2.44', ELEV. – −1.05+2.44'=1.39, USE 1.42
DEPTH IN PIPE AT NO. 7 USING 25.54 CFS, S=0.0013 = 2.41', ELEV. = −0.86+2.41'=1.55, USE 1.74
DEPTH IN PIPE AT NO. 6A USING 26.02 CFS, S=0.0013 = 2.47', ELEV. = −0.57+2.47=1.90, USE 2.17
DEPTH IN PIPE AT NO. 5 USING 26.34 CFS, S=0.0036 = 1.69', ELEV. = −0.37+1.69'=1.32, USE 2.51
DEPTH IN PIPE AT NO. 4 USING 16.75 CFS, S=0.0015 = 1.99', ELEV.=3.51+1.99=5.50, USE 5.50
DEPTH IN PIPE AT NO. 3 USING 16.98 CFS, S=0.0015 = 2.02, ELEV.=3.73+2.02=5.75, USE 5.83
DEPTH IN PIPE AT NO. 2 USING 17.11 CFS, S=0.0016 = 1.97', ELEV.=4.04+1.97=6.01, USE 6.26
DEPTH IN PIPE AT NO. 1 USING 0.35 CFS, S=0.0010 = 0.37', ELEV.=4.24+0.37=4.61, USE 6.52

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$I_{100} = \frac{285.2}{24.7 + T_c}$

MHW (NAV 88) = 1.10
MLW = -1.66

STORM SEWER DESIGN COMPUTATIONS

ROUTE: _____ PROJ: PER PROPERTIES OCT 12, 2013
COUNTY: _____ DISTRICT: _____
DESCRIPTION: _____
SHEET _____ OF _____

OFFSITE

FROM POINT	TO POINT	AREA DRAIN "A" ACRES	RUN-OFF COEF. C	CA INCRE-MENT	CA ACCUM-ULATE	INLET TIME MIN-UTES	RAIN FALL IN./HR.	RUN-OFF Q C.F.S.	INVERT ELEVATIONS UPPER END	INVERT ELEVATIONS LOWER END	LENGTH FT.	SLOPE FT./FT.	DIA. IN.	CAPA-CITY C.F.S.	VEL. F.P.S.	FLOW TIME MIN	REMARKS
1A	1	.0734	0.50	.0367		5	9.60	0.35	4.36	4.23	134	.0010	12"	1.22	1.54	1.60	✓
1	2	1.9646	.8883	1.7451	1.7818	5	9.60	17.11	4.23	4.04	119	.0016	30"	17.77	4.12	0.51	✓
2	3	.0351	.50	.0175	1.7993	5.51	9.44	16.98	4.04	3.73	204	.0015	30"	17.21	4.00	0.85	
3	4	.0514	.50	.0257	1.825	6.36	9.18	16.75	3.73	3.50	156	.0015	30"	17.21	3.99	0.65	
4	5	1.7214	.90	1.1047	2.9297	7.01	8.99	26.34	-0.14	-0.37	150	.0015	36"	27.98	4.50	0.56	
5	6A				2.9297	7.41	8.33	26.02	-0.37	-0.57	154	.0013	36"	26.05	4.20	0.61	
6A	7				2.9297	8.02	8.71	25.94	-0.57	-0.86	220	.0017	36"	26.05	4.20	0.87	
7	8				2.9297	8.89	8.49	24.87	-0.86	-1.05	158	.0012	36"	25.03	4.04	0.65	
8	OUTLET				2.9297	9.54	8.33	24.40	-1.05	-1.23	152	.0012	36"	25.03	4.04	0.63	

LD-347 Rev. 8/11/09 BEGIN TW ELEV = MHW = 1.10

HYDRAULIC GRADE LINE OFFSITE

PROJECT: PER PROPERTIES OCT 12, 2013

INLET STATION	Outlet Water Surface Elev.	D_o	Q_o	L_o	S_{f_o} %	H_f	JUNCTION LOSS												Final H	Inlet Water Surface Elev.	Rim Elev.
							V_o	H_o	Q_i	V_i	Q_iV_i	$\frac{V_i^2}{2g}$	H_i	Angle	H_Δ	H_t	1.3 H_t	0.5 H_t			
3	1.10	36"	24.40	152	.134	.203	4.04	.063	24.87	4.04	100.47	.2584	.089	53°	.031	.24	–	.12	.33	1.42	10.50
7	1.42	36"	24.87	153	.139	.2196	4.04	.063	25.54	4.20	107.27	.274	.096	17°	.034	.193	–	.10	.32	1.74	10.50
6A	1.74	36"	25.54	220	.147	.3225	4.20	.0685	26.02	4.20	109.28	.274	.096	25°	.060	.225	–	.11	.43	2.17	10.50
5	2.17	36"	26.02	154	.152	.234	4.20	.068	26.34	4.60	113.53	.314	.1101	17.5°	.041	.219	–	.11	.34	2.51	10.50
4	2.51	36"	26.34	150	.156	.239	4.50	.079	16.75	3.99	66.83	.247	.087	90°	.173	.338	–	.17	.40	2.91	10.50 *
3	5.50	30"	16.75	156	.167	.26	3.99	.062	16.98	4.00	67.92	.248	.087	0°	–	.149	–	.074	.33	5.83	10.50/6.9
2	5.83	30"	16.98	201	.171	.347	4.00	.062	17.11	4.12	70.49	.264	.092	0°	–	.154	–	.08	.43	6.26	10.50/6.9
1	6.26	30"	17.11	126	.174	.219	4.12	.065	0.35	1.34	0.47	.028	.0098	0°	–	.076	–	.04	.26	6.52	10.50/6.9
1A	6.52	12"	0.35	129	.010	.012	1.34	.007	–	–	–	–	–	0°	–	.007	–	.02	.004	6.54	10.50/7.4

DEPTH e 8 USING 24.87 CFS, S_o = .0012 = 2.44' ELEV. = -1.05 + 2.44' = 1.39 (USE 1.42)

DEPTH e 7 USING 25.54 CFS, S_o = .0013 = 2.41' ELEV. = -0.86 + 2.41' = 1.55' (USE 1.74)

FINAL H = $H_f + H_t$

$H_i = 0.35\ V_i^2/2g$; $H_o = 0.25\ V_o^2/2g$; $H_\Delta = K\ V_i^2/2g$; $H_t = H_o + H_i + H_\Delta$

90° K = 0.70	50° K = 0.50	20° K = 0.25
80° K = 0.66	40° K = 0.43	15° K = 0.19
70° K = 0.61	30° K = 0.35	10° K = 0.13
60° K = 0.56	25° K = 0.30	5° K = 0.06

DEPTH 6A USING 26.02 CFS, S_o = .0015 = 2.47' ELEV. = -0.57 + 2.47' = 1.90 (USE 2.17)

DEPTH 5 USING 26.34 CFS, S_o = .0036 = 1.69 ELEV. = -0.37 + 1.64 = 1.32 (USE 2.51)

DEPTH 4 USING 16.75 CFS, S_o = .0015 d = 30" depth = 1.99' ELEV. 3.51 + 1.99 = 5.50, USE 5.50

* ELEV. 2.9 = EX. ELEV. ON DIXON PROPERTY (GOOD)

MHW ELEV. = 1.1005
MLW ELEV. = -1.6554
AVG. =

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July 2000

STORM SEWER DESIGN COMPUTATIONS

ONSITE DRAINAGE

ROUTE: _____ PROJ: PER PROPERTIES
COUNTY: _____ DISTRICT: REV AUG. 2013
DESCRIPTION: _____
SHEET _____ OF _____

I.00" 285.2/24.7 = Tc

FROM POINT	TO POINT	AREA DRAIN "A" ACRES	RUN-OFF COEF. C	CA INCREMENT	CA ACCUMULATE	INLET TIME MINUTES	RAIN FALL IN./HR.	RUN-OFF Q C.F.S.	INVERT ELEVATIONS UPPER END	INVERT ELEVATIONS LOWER END	LENGTH FT.	SLOPE FT./FT.	DIA. IN.	CAPACITY C.F.S.	VEL. F.P.S.	FLOW TIME MIN.	REMARKS
10	11	.7636	.7684	.5867		5	9.00	5.03	4.77	3.73	417'	.0025	24"	12.25	3.82	1.82	(VOID)
11	12	.7583	.8249	.6255	1.2123	6.82	9.03	10.94	3.73	3.33	198'	.0020	24"	10.96	3.49	0.85	✓
12	12A				1.2123	7.72	8.30	13.98	3.33	3.13	59'	.0034	24"	14.29	5.18	0.19	✓
12A	13	.5396	.6377	.376	1.5833	7.91	8.75	13.89	3.13	2.49	191	.0034	24"	14.29	5.13	0.61	✓
																	✓
RR TRACKS	13	.1289	.70	.0902		10	8.22	0.74	8.50	7.29	117	.0103	12"	3.92	3.33	0.51	
9A	8A	1.651	.7267	1.1998		15	7.13	8.61	4.09	3.44	109'	.0060	18"	8.31	5.03	0.32	✓
8A	7A	2.2019	.73	1.6075	2.8573	15.32	7.13	20.01	3.44	2.00	215'	.0067	24"	20.06	6.38	0.49	✓
15	14	.816	.779	.6357		8.5	8.59	5.46	3.23	2.96	89'	.0030	18"	6.23	3.93	.37	✓
14	13	1.3335	.7117	.9385	1.6242	8.87	8.47	13.79	2.90	2.49	196'	.0024	24"	13.86	5.03	.65	✓
13	7A	1.0974	.7317	.8032	4.1059	9.52	8.33	34.22	2.49	2.00	215'	.0023	30"	34.65	5.59	.64	✓
7A	6	1.4733	.7723	1.1356	8.0433	15.81	7.04	56.67	4.00	1.87	344	.0062	36"	56.89	9.13	.62	✓
5A	6	.8509	.70	.5956		9.50	8.34	4.97	5.09	3.41	330	.0051	15"	5.00	4.64	1.19	✓
6	OUT	2.5361	.7034	1.7839	10.4283	10.43	6.93	72.27	-0.58	-1.30	144	.005	42"	77.07	9.11	.26	✓
10	10A			.5867		5	9.00	5.03	4.77	4.25	23'	.0025	24"	12.25	3.82		
10A	11			.5867		5	9.00	5.03	4.25	3.73	394'	.0025	24"	12.25	3.82		

LD-347 Rev. 8/11/09 MHW Elev. = 1.10 ONSITE DRAINAGE

HYDRAULIC GRADE LINE

PROJECT: PER PROPERTIES REV. AUG. 2013

INLET STATION	Outlet Water Surface Elev.	D_o	Q_o	L_o	Sf_o %	H_f	JUNCTION LOSS												Final H	Inlet Water Surface Elev.	Rim Elev.
							V_o	H_o	Q_i	V_i	Q_iV_i	$V_i^2/2g$	H_i	Angle	H_Δ	H_t	1.3 H_t	0.5 H_t			
6	1.10	42"	72.27	144	.516	.74	9.11	.32	56.67	9.18	520.23	1.31	.46	1°	.01	.79	1.03	.51	1.26	2.36	9.70
5	2.67	15"	4.97	330	.592	1.95	4.64	.084	–	–	–	–	–	–	–	.084	.109	.05	2.00	4.67	9.70
7A	2.67	36"	56.67	344	.722	2.48	9.18	.327	72.27	10.22	738.6	1.62	.567	90°	1.14	2.03	2.64	3.80	5.80	6.47	9.70
13	6.47	30"	34.22	215	.696	1.49	5.59	.121	12.33	5.11	71.44	.41	.14	0°	–	.26	.342	.17	1.67	8.14	9.70
12	8.14	24"	13.93	254	.382	.97	5.11	.10	10.94	3.49	38.18	.19	.07	89°	.13	.30	.39	.19	1.16	9.30	9.70
11	9.30	24"	10.94	198	.234	.46	3.49	.05	5.63	3.67	20.66	.21	.07	0°	–	.12	.16	.09	.54	9.84	10.00
10	9.84	24"	5.63	417	.062	.26	3.82	.06	–	–	–	–	–	–	–	.06	.07	.04	.295	10.13	10.13
8A	6.47	24"	20.01	215	.732	1.68	6.38	.16	8.61	5.68	48.9	.50	.13	23°	.10	.43	.56	.23	1.91	8.38	
9A	8.38	18"	8.61	109	.671	.731	5.08	.13	–	–	–	–	–	–	–	.13	.16	.08	.81	9.61	

$H_i = 0.35\ V_i^2/2g$; $H_o = 0.25\ V_o^2/2g$; $H_\Delta = K\ V_i^2/2g$; FINAL $H = H_f + H_t$; $H_t = H_o + H_i + H_\Delta$

90° K = 0.70	50° K = 0.50	20° K = 0.25
80° K = 0.66	40° K = 0.43	15° K = 0.19
70° K = 0.61	30° K = 0.35	10° K = 0.13
60° K = 0.56	25° K = 0.30	5° K = 0.06

344

imbrium

PROJECT:	PER PROPERTIES
DATE:	**PAGE:** **OF:**

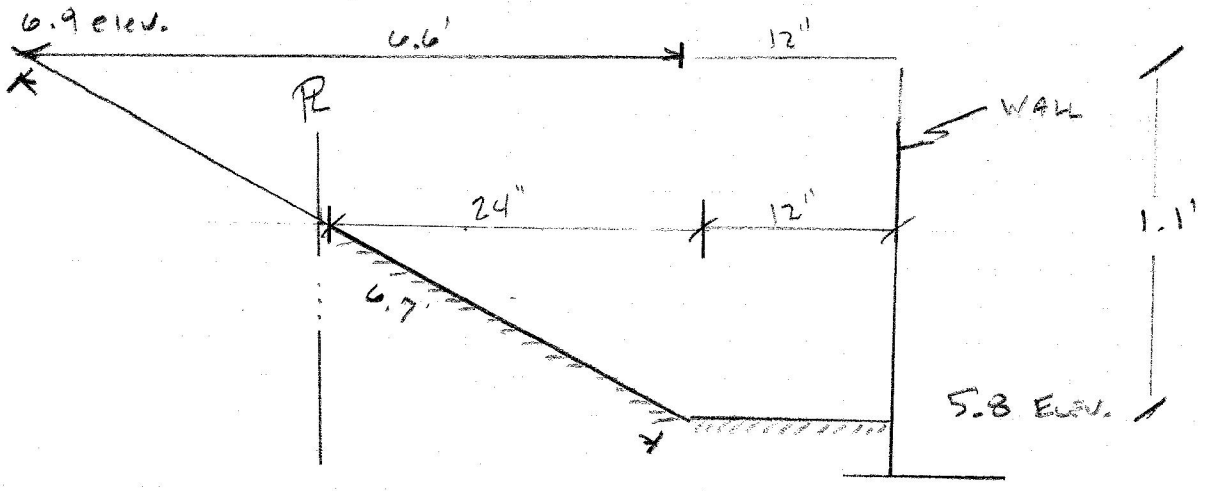
CHECK DITCH CAPACITY NEAR STMH-1

$Q_{100} = CAI$

$= (0.5)(1.0384)(10.0) = 0.19$ CFS

TO 30" FES DOWNSTREAM TO PICK UP OFFSITE RUNOFF

FORM LD-269 SHOWS HW DEPTH = 0.37', ELEV. = 0.07', TOP BANK = 6.9



X S: $(6.9 - 5.8)(1.0) = 1.1$ FT²

$+ 0.5 \times 6.6' \times 1.1' = 3.63$ FT² / $\Sigma = 4.73$

W.P. = 6.7 + 1.0 = 7.7

R = 4.73 / 7.7 = 0.61

n FACTOR = 0.45, DENSE GROWTH, S_o = 0.005 F/F

$Q_{cap.} = 1.486/n \, A R^{2/3} S^{1/2}$

$= (1.486/0.045)(4.73)(0.61)^{0.67}(0.005)^{0.5}$

$= 0.79$ CFS > 0.19 CFS

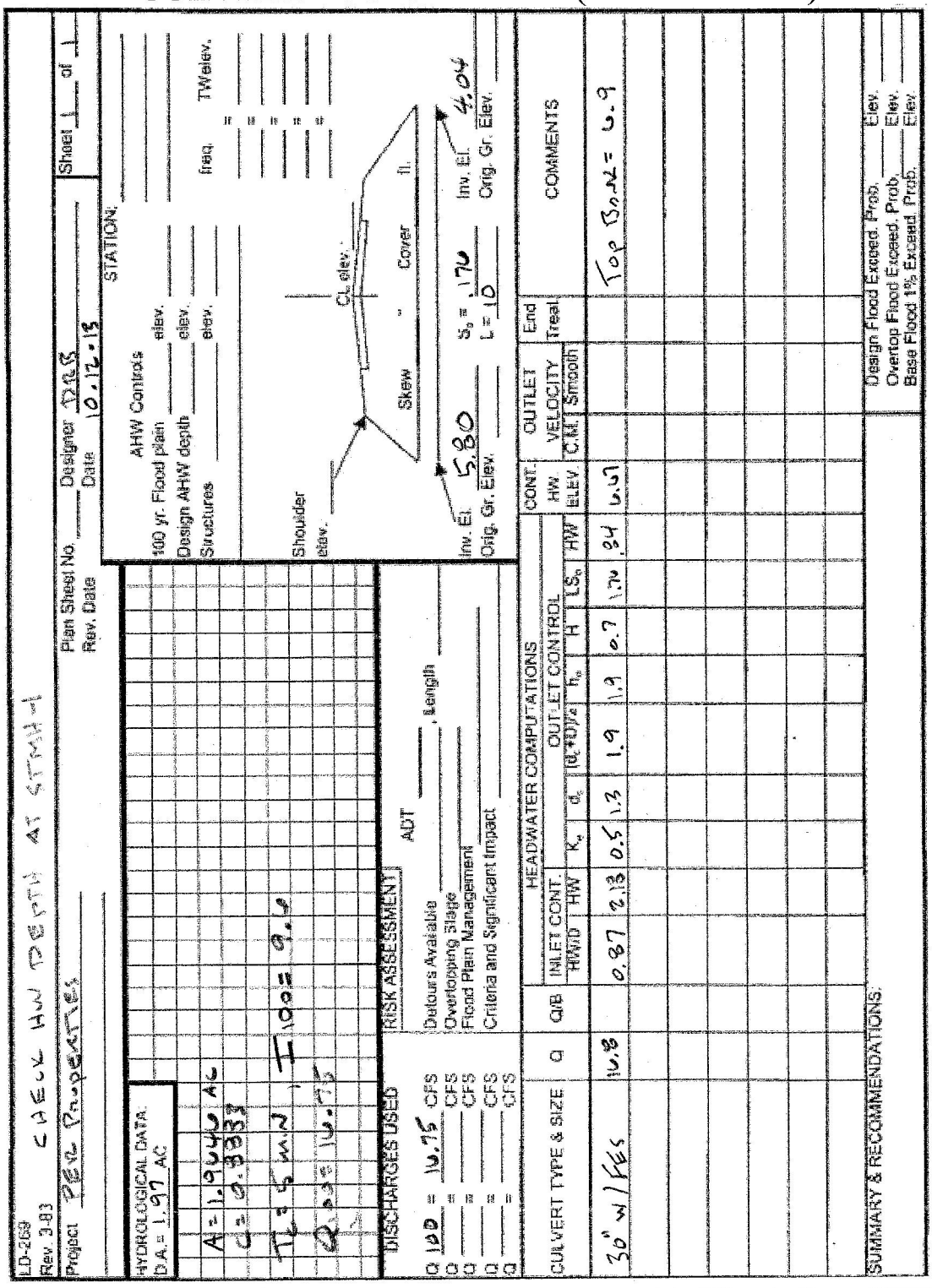
Imbrium Systems Inc.
12 Madison Avenue
Toronto, ON M5R 2S1
T: 416-960-9900 T: 800-565-4801
F: 416-960-5637

Imbrium Systems Corporation
9420 Key West Avenue, Suite 140
Rockville, MD 20850
T: 301-279-8827 T: 888-279-8826
F: 301-279-5433

www.imbriumsystems.com

Stormceptor®

CULVERT DESIGN FORM (VDOT LD-269)



ENTRANCE LOSS COEFFICIENTS (K_e) OUTLET CONTROL, FULL OR PARTIALLY FULL

Type of Structure and Design of Entrance	Coefficient
Pipe, Concrete	
Mitered to conform to fill slope	0.7
End-section conforming to fill slope	0.5
Projecting from fill, square cut end	0.5
Headwall or headwall and wingwall	
Square-edge	0.5
Rounded (radius = 1/12 D)	0.2
Socket end of pipe (groove end)	0.2
Projecting from fill, socket end (groove end)	0.2
Beveled edges, 33.7° or 45° bevels	0.2
Side or slope-tapered inlet	0.2
Pipe, Corrugated Metal (or Corrugated HDPE)	
Projecting from fill (no headwall)	0.9
Mitered to conform to fill slope, paved or unpaved slope	0.7
Headwall or headwall and wingwall, square-edge	0.5
End section conforming and to fill slope	0.5
Beveled edges, 33.7° or 45° bevels	0.2
Side or slope-tapered inlet	0.2
Box, Reinforced Concrete	
Wingwalls parallel (extension of sides), square edged at crown	0.7
Wingwalls at 10° to 25° or 30° to 75° to barrel,	
square edged on 3 edges	0.5
rounded on 3 edges to radius of 1/12 barrel	0.2
Wingwalls at 30° to 75° to barrel,	
crown edge rounded to radius 1/12 of barrel	0.2
Side or slope-tapered inlet	0.2

Note: End Section conforming to fill slope made of metal, concrete, or HDPE, are the sections commonly available from manufacturers. From limited hydraulic test they are equivalent in operation to a headwall in both inlet and outlet control. Some end sections incorporating a closed taper in their design have a superior hydraulic performance. These latter sections can be designed using the information given for the beveled inlet.

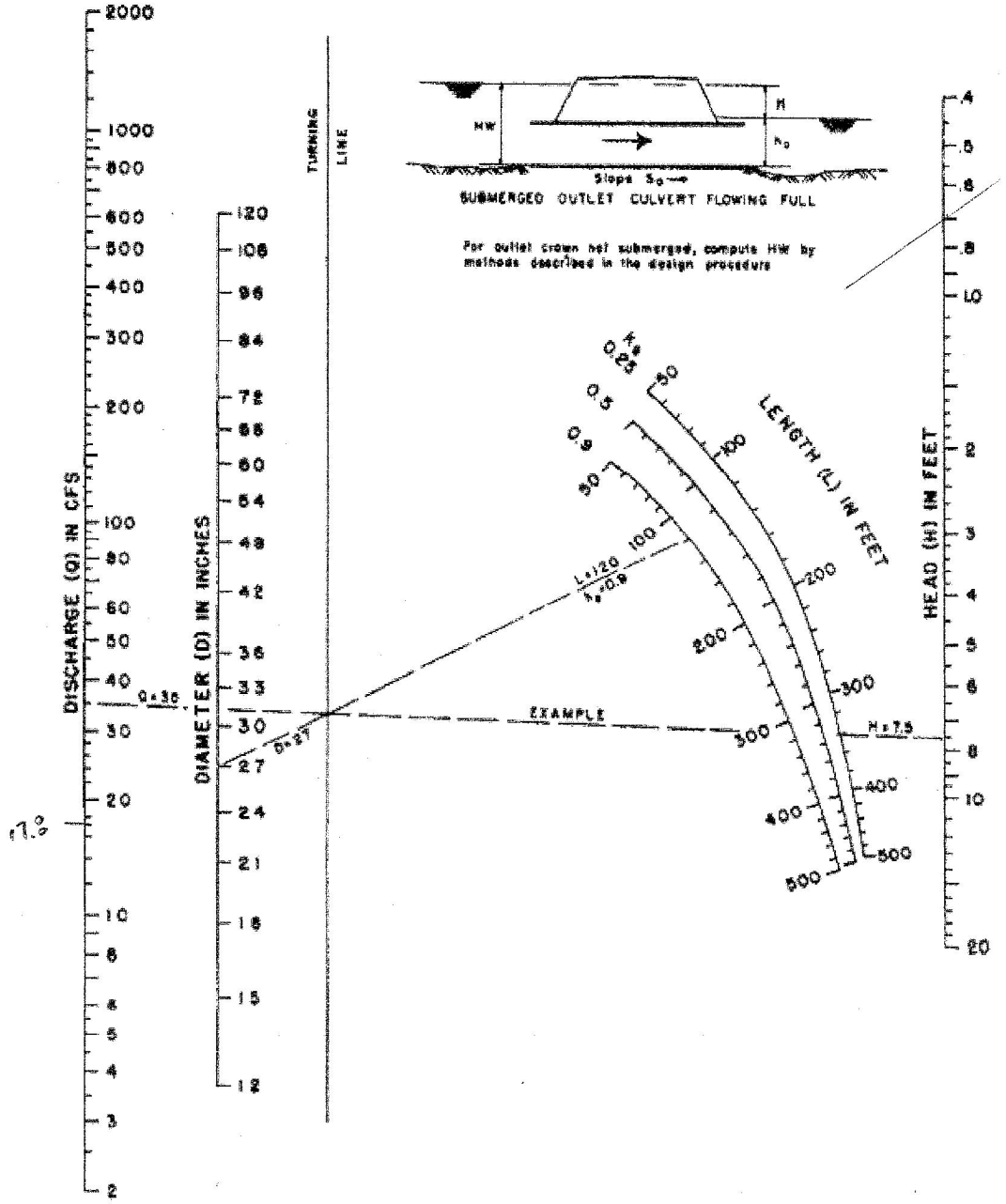
OUTLET CONTROL, CIRCULAR CONCRETE PIPE RECOMMENDED MANNING'S n-VALUES

Type of Conduit	Wall Description	Manning's n
Concrete Pipe	Smooth walls	0.010 - 0.013
Concrete Boxes	Smooth walls	0.012 - 0.015
Corrugated Metal Pipes and Boxes, Annular or Helical Pipe	2 2/3 by ½ inch corrugations	0.022 - 0.027
	6 by 1 inch corrugations	0.022 - 0.025
	5 by 1 inch corrugations	0.025 - 0.026
	3 by 1 inch corrugations	0.027 - 0.028
	6 by 2 inch structural plate	0.033 - 0.035
	9 by 2 ½ inch structural plate	0.033 - 0.037
Corrugated Metal Pipe	2 2/3 by ½ inch corrugations	0.012 - 0.024
Spiral Rib Metal (Steel or Alum.)	Smooth walls	0.012-0.013
PVC	Smooth interior	0.010 - 0.012
Polyethylene (PE or HDPE)	Smooth interior	0.011 - 0.013
Corrugated PE or HDPE	Corrugated interior	0.022 - 0.026

Note 1: The values indicated in this table are recommended Manning's "n" design values. Actual field values may vary depending on the effects of abrasion, corrosion, deflection, and joint conditions. Concrete pipe with poor joints and deteriorated walls may have "n" values of 0.014 to 0.018. Corrugated metal with join and wall problems may also have higher "n" values, and in addition, may experience shape changes which could adversely affect the general hydraulic characteristics of the culvert.

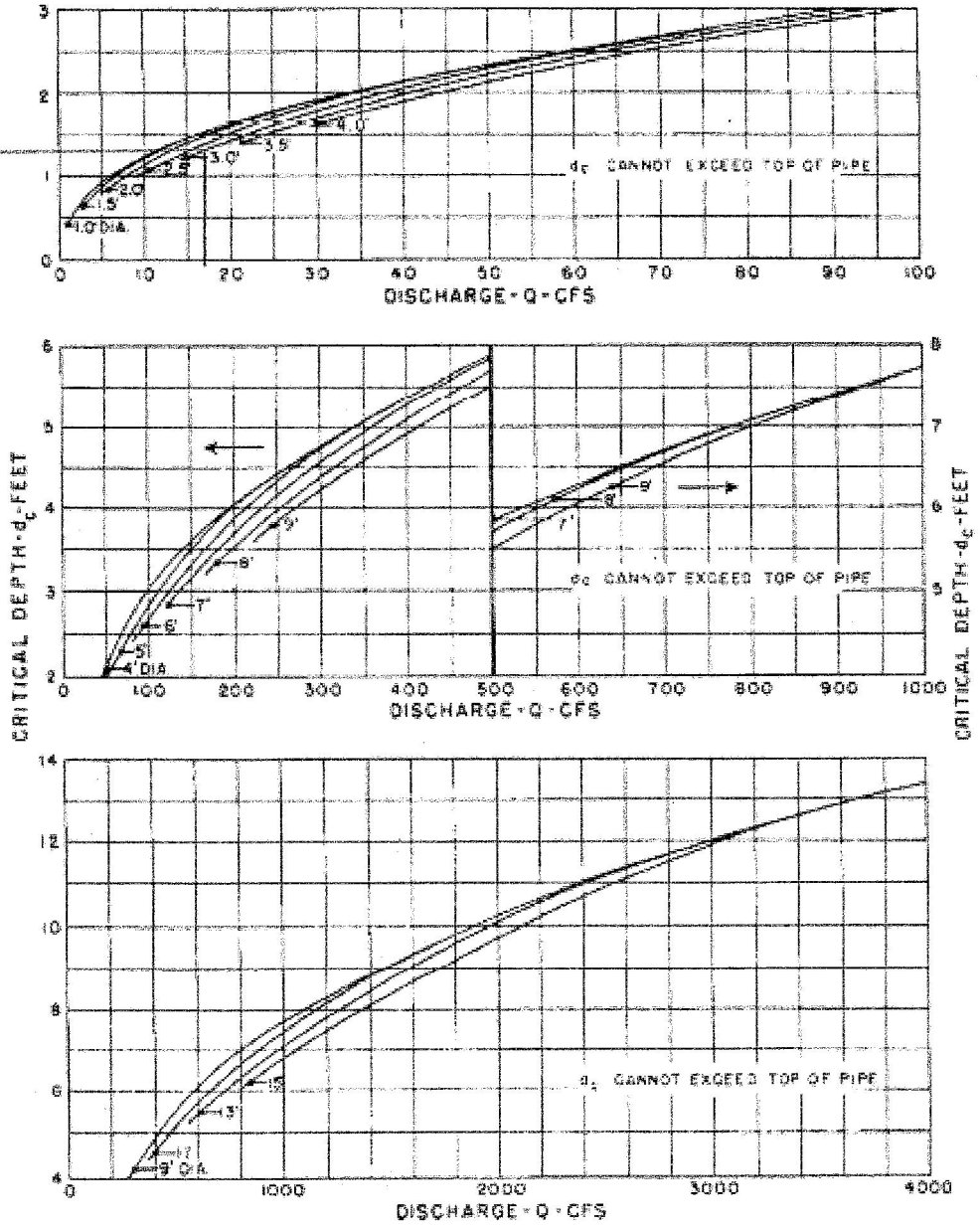
Note 2: Fore further information concerning Manning n values for selected conduits consult Hydraulic Design of Highway Culverts, Federal Highway Administration, HDS No. 5, page 163.

OUTLET CONTROL, CIRCULAR CORRUGATED METAL PIPE



CRITCAL DEPTH, CIRCULAR PIPE

CHART 4

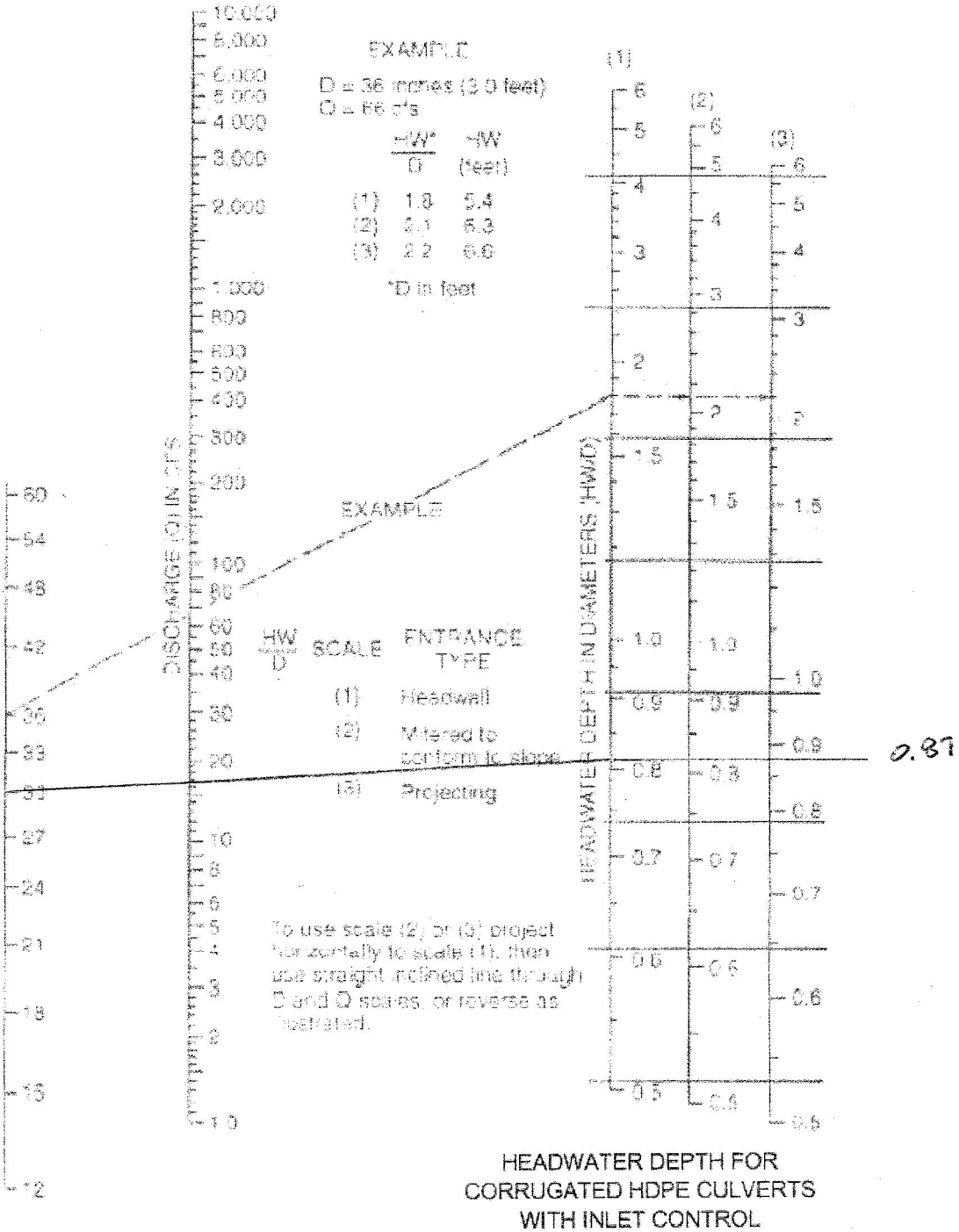


d_c = 1.3'

BUREAU OF PUBLIC ROADS
JAN. 1964

CRITICAL DEPTH
CIRCULAR PIPE

INLET CONTROL, CIRCULAR HDPE PIPE



HEADWATER DEPTH FOR
CORRUGATED HDPE CULVERTS
WITH INLET CONTROL

Hydrograph Plot

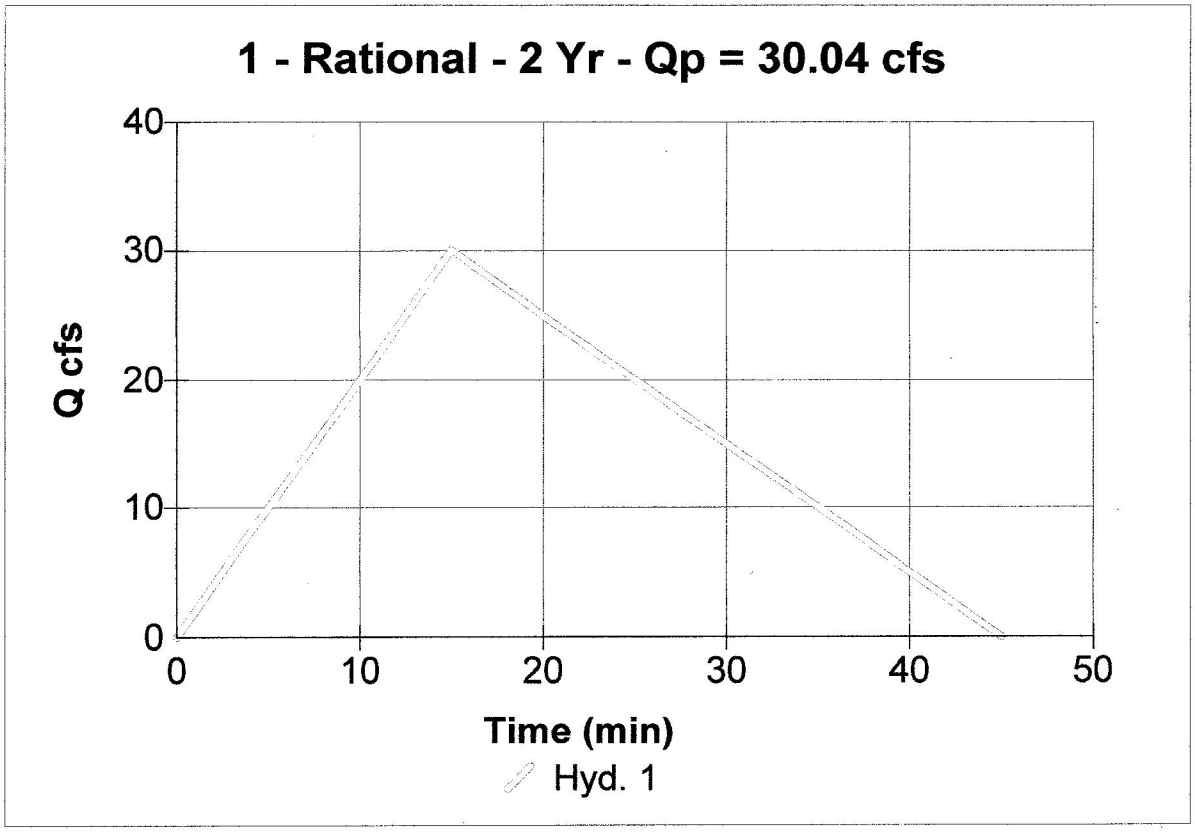
English

Hyd. No. 1

2 YEAR STORM AT BMP

Hydrograph type	= Rational	Peak discharge	= 30.04 cfs
Storm frequency	= 2 yrs	Time interval	= 1 min
Drainage area	= 8.5 ac	Runoff coeff.	= 0.9
Intensity	= 3.91 in	Time of conc. (Tc)	= 15 min
I-D-F Curve	= NORFOLK1.IDF	Reced. limb factor	= 2

Total Volume = 40,561 cuft



Performance Database (NPRPD). In addition, we have liberally borrowed from the cutting-edge ideas expressed in the newer BMP stds & specs from other states in the region.

To assist in development of these BMP stds & specs, a literature search was performed to compile data to support updated runoff volume reduction and pollution removal capabilities for different BMPs. Based on the research findings, runoff volume reduction rates were assigned and removal rates for Total Phosphorus were updated for various BMPs, as shown in **Table 4.1.** The explanation for these decisions can be found in the Technical Memorandum: The Runoff Reduction Method [pdf] developed for DCR and others by the Center for Watershed Protection, in support of DCR's regulation and Handbook revision processes.

***Table 4.1. BMP Pollutant Removal Efficiencies* (March 1, 2011)**

Practice Number	Practice	Removal of TP by Runoff Reduction (RR, as %) (based upon 1 inch of rainfall)	Removal of TP by Treatment – Pollutant (EMC) Reduction (PR, as %)	Total Mass Load Removal of Total Phosphorus (TR, as %)
1	Rooftop Disconnection	25 or 50 [1]	0	25 or 50 [1]
2	Sheetflow to Vegetated Filter or Conserved Open Space 1	25 to 50 [1]	0	25 to 50 [1]
	Sheetflow to Vegetated Filter or Conserved Open Space 2 [5]	50 to 75 [1]	0	50 to 75 [1]
3	Grass Channel	10 to 20 [1]	15	23
4	Soil Amendments	Used to decrease runoff coefficient for turf cover at the site. See the design specs for Roof Disconnection, Sheet Flow to Vegetated Filter or Conserved Open Space, and Grass Channels		
5	Vegetated Roof 1	45	0	45
	Vegetated Roof 2	60	0	60
6	Rainwater Harvesting	Up to 90 [3, 5]	0	Up to 90 [3, 5]
7	Permeable Pavement 1	45	25	59

	Permeable Pavement 2	75	25	81
8	Infiltration 1	50	25	63
	Infiltration 2	90	25	93
9	Bioretention 1	40	25	55
	Bioretention 2	80	50	90
	Urban Bioretention	40	25	55
10	Dry Swale 1	40	20	52
	Dry Swale 2	60	40	76
11	Wet Swale 1	0	20	20
	Wet Swale 2	0	40	40
12	Filtering Practice 1	0	60	60
	Filtering Practice 2	0	65	65
13	Constructed Wetland 1	0	50	50
	Constructed Wetland 2	0	75	75
14	Wet Pond 1	0	50 (45) [4]	50 (45) [4]
	Wet Pond 2	0	75 (65) [4]	75 (65) [4]
15	Extended Detention Pond 1	0	15	15
	Extended Detention Pond 2	15	15	31

COMMERCIAL SITE PLAN

FOR

PER PROPERTIES

SPECIAL NOTES

1. Maximum allowable slopes on driveways shall be 12:1. Driveways shall be placed to nearest joint. Contractor to verify limits of all drives with the Engineer.
2. Preserve all power poles not in conflict. Coordinate relocation of conflicting power poles with the Engineer and company. Cost of utility pole relocations shall be by utility owner.
3. All drives shall be concrete in the R.O.W.
4. There shall be a minimum of six inches between adjacent driveway entrance aprons as measured at the curb.
5. Removal and replacement of gravel drives and tie-ins at the edge of aprons is the responsibility of the contractor. Coordinate limits of work with the Engineer. Drives shall be a minimum of 4" gravel beyond existing R.O.W. (see plans for locations).
6. All water meters and sanitary sewer cleanouts must be set behind the curb within the City right-of-way.
7. Coordinate replacement of outdated meters with the Engineer and the City Public Utilities Department.
8. All fence removal and replacement shall be coordinated by the Engineer and homeowner.
9. The Contractor shall adjust the tie-in length for new walks to accommodate steps as directed by the Engineer.
10. The Contractor shall remove and replace curb and gutter as necessary to complete utility work. Curb and gutter shall be replaced in 10 foot sections. The cost of replacing this curb and gutter will not be measured separate for payment and will be included in the respective utility pay item.
11. All items of work required by the documents to complete the project, but not specifically included in a pay item shall be considered an incidental item in accordance with Specification Section 109.

LEGEND

- FIRE HYDRANT
- CURB & GUTTER
- EDGE OF PAVEMENT
- SWALE
- CTV BOX
- SIGN
- STREET LAMP
- TELE. BOX
- SEWER CLEAN OUT
- WATER METER
- W.V. WATER VALVE
- FENCE
- MANHOLE
- CATCH BASIN
- PROPOSED DROP INLET
- PROPOSED STORM SEWER
- SEWER PIPE
- WATER LINE
- OVERHEAD WIRE
- LIGHT POLE
- POWER POLE
- C.B. CATCH BASIN
- SSMH SANITARY SEWER MANHOLE
- SDMH STORM DRAIN MANHOLE
- INV INVERT
- GTD GRADE TO DRAIN
- FG FINISHED GRADE
- FL FLOW LINE
- TC TOP OF CURB
- FIRE HYDRANT
- 10.0 PROP. ELEVATION
- 10.0 PROP. CONTOUR
- 10.0 EXIST. ELEVATION
- VEGETATED WETLANDS
- TEMPORARY BENCHMARK (TBM)
- FLARED END SECTION
- IRON ROD FOUND

THIS PLAN DOES NOT GUARANTEE THE EXISTENCE OR LOCATION OF THE UNDERGROUND UTILITIES SHOWN HEREON, NOR DOES IT GUARANTEE THE NON-EXISTENCE OF UNDERGROUND UTILITIES WHICH MAY BE PRESENT. THIS PLAN DOES NOT GUARANTEE THE ABSENCE OF CONFLICTS WITH UNDERGROUND UTILITIES. IF, DURING THE COURSE OF CONSTRUCTION, DISCREPENCIES ARE DISCOVERED BETWEEN THE UNDERGROUND UTILITIES SHOWN ON THIS PLAN AND ACTUAL FIELD CONDITIONS, THE CONTRACTOR SHALL NOTIFY GALLUP SURVEYORS & ENGINEERS, LTD. BEFORE PROCEEDING WITH FURTHER CONSTRUCTION.

IT SHALL BE THE OWNER'S/DEVELOPER'S RESPONSIBILITY TO ASCERTAIN THE EXISTENCE AND/OR NON-EXISTENCE OF THE FOLLOWING WITH REGARDS TO THIS SITE.
1) DEED RESTRICTIONS
2) JURISDICTIONAL WETLANDS
3) HAZARDOUS MATERIALS

NOTE:
THIS PLAN IS TO BE USED FOR EROSION AND SEDIMENT CONTROL, DRAINAGE STRUCTURE AND PIPE INSTALLATION ONLY. THE PROPOSED BUILDINGS AND VARIOUS INFRASTRUCTURE SHOWN ARE ILLUSTRATIVE ONLY AND ARE NOT TO BE CONSTRUCTED UNTIL THE CITY OF PORTSMOUTH HAS APPROVED THE COMMERCIAL SITE PLAN

SITE DATA

LEGAL: PROPERTY LABELED "PORTSMOUTH PORT AND INDUSTRIAL COMMISSION SHOWN ON BOUNDARY SURVEY OF THE PROPERTY OF PORTSMOUTH PORT AND INDUSTRIAL COMMISSION, PORTSMOUTH, VIRGINIA RECORDED IN MAP BOOK 22, PAGE 109, 110
ADDITIONAL REFERENCE: DEED BOOK 772, PAGE 381

ZONED: INDUSTRIAL

BENCHMARK: CITY OF PORTSMOUTH BM STATION 41-35
IRON ROD SET FLUSH WITH PAVEMENT LOCATED IN THE APPROXIMATE CENTERLINE OF VENEER RD,. NORTHWEST FROM A FIRE HYDRANT LOCATED ON THE EAST SIDE OF VENEER ROAD, 34.5' NORTHEAST OF CENTER OF FACE OF CATCH BASIN, AND 16.9' EAST OF BACK OF CURB; ELEVATION 4.30
DATUM: NAVD 88

FLOOD ZONE INFORMATION:
ACCORDING TO F.E.M.A.'S FLOOD INSURANCE RATE MAP (F.I.R.M.), THE PROPERTY SHOWN HEREON APPEARS TO FALL WITHIN FLOOD ZONE 'B', AND ZONE A4 COMMUNITY PANEL NO. 515529-0060B, MAP REVISED 11/02/83, BASE FLOOD EL. 8.5 (NGVD 29) (BASE FLOOD ELEVATION ADJUSTED TO NAV 88 IS APPROXIMATELY 7.8)

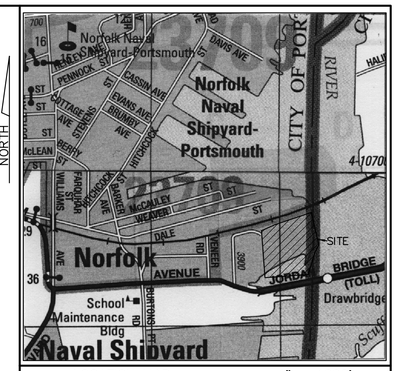
BEFORE YOU DIG, TO MISS THE UTILITIES, CALL "MISS UTILITY" OF VIRGINIA AT 811.

CONSULTANTS

BOUNDARY SURVEY PREPARED BY STEVE BOONE AND ASSOCIATES, P.C., RECORDED IN M.B. 22, P. 109, 110

CONTAINMENT BERM SHOWN OBTAINED FROM PLANS TITLED, "REMEDIAL DESIGN - PHASE 2, EAST SIDE CONTAINMENT BERM, ATLANTIC WOOD INDUSTRIES SUPERFUND SITE, PREPARED BY EA ENGINEERING, SCIENCE, AND TECHNOLOGY, DATED 1/2011

UTILITIES SHOWN OBTAINED FROM PLANS TITLED, "REMEDIAL DESIGN - PHASE 2, EAST SIDE CONTAINMENT BERM, ATLANTIC WOOD INDUSTRIES SUPERFUND SITE, PREPARED BY EA ENGINEERING, SCIENCE, AND TECHNOLOGY, DATED 1/2011, AND FROM FIELD SURVEY BY GALLUP SURVEYORS AND ASSOCIATES, AND FROM CITY RECORD DRAWINGS.



LOCATION MAP 1" = 1000'
PERMIT NO. 20111222

City of Portsmouth
Site Plan Information

Approved for Data Entry: _____
City Use Only Engineer Initials & date

CITY FILE NUMBER	C1113
SITE PLAN TITLE	E & SC PLAN FOR PER PROPERTIES
SITE ADDRESS	3991 ELM AVENUE
TAX MAP/PARCEL NUMBER	03870100
SITE OWNER	PER PROPERTIES
OWNER ADDRESS	P.O. BOX 57008 VIRGINIA BEACH, VA. 23457
OWNER CONTACT	JIM SALMONS
OWNER PHONE	757-426-6824
OWNER FAX	757-721-9071
OWNER EMAIL	CRYSTAL@SALMONSINC.COM
SITE DEVELOPER	JIM SALMONS
DEVELOPER ADDRESS	P.O. BOX 57008 VIRGINIA BEACH, VA. 23457
DEVELOPER CONTACT	JIM SALMONS
DEVELOPER PHONE	757-426-6824
DEVELOPER FAX	757-721-9071
DEVELOPER EMAIL	SALMONSFARMS@AOL.COM

SITE STATISTICS		EXISTING	ADDED/ DELETED(+/-)	PROPOSED
TOTAL DISTURBED AREA	ac			11.2
TOTAL SITE AREA	ac	11.876	+2.9776	14.8536
IMPERVIOUS AREA	ac	1.152	-1.152	6.5012
SEMI-PERVIOUS AREA	ac	0	+11.4772	11.4772
PERVIOUS AREA	ac	10.724	-10.724	-
RIGHT-OF-WAY DISTURBANCE	sf			NONE

NEW BMP INFORMATION		BMP #1	BMP #2	BMP #3
BMP TYPE		INFILTRATION 2 PRACTICE NO. 8		
AREA TREATED BY BMP	ac.	8.5344		
SURFACE AREA OF BMP	S.F.	5,507 S.F.		
STORAGE VOLUME	c.f.	11,898 C.F.		
MAX AVERAGE DEPTH	ft.	4.8 FT.		
QUALITY, QUANTITY, OR BOTH?		BOTH		
SITE IN CBPA?	Y/N ?	YES	RMA/RPA/IDA?	ALL 3

THE SITE WILL UTILIZE INFILTRATION AND VOID STORAGE IN A GRAVEL TRENCH. A PORTION OF THE STORM DRAIN PIPE SYSTEM WILL BE PERFORATED TO ALLOW THE STORMWATER TO INFILTRATE THROUGH THE STONE AND INTO THE NATIVE SOILS
RUNOFF C FACTOR UTILIZED FOR GRAVEL: 0.70

CONSTRUCTION SEQUENCE

1. OBTAIN ALL REQUIRED PERMITS
2. INSTALL SILT FENCE
3. INSTALL CONSTRUCTION ENTRANCE
4. ADJUST SILT FENCE AS REQUIRED
5. PLACE CRUSHED CONCRETE FILL MATERIAL IN 6" LIFTS
6. EXCAVATE FOR BMP AND STORM DRAINS
7. INSTALL FILTER FABRIC, PIPES, INLETS, AND 57 STONE
8. CONTINUE FILLING AND ADJUSTING BERM
10. INSTALL INLET PROTECTION AS INLETS ARE SET.

ANY AND ALL MATERIAL/DEBRIS TRACKED ONTO A PUBLIC ROAD SURFACE SHALL BE CLEANED THOROUGHLY AT THE END OF EACH DAY. SEDIMENT SHALL BE REMOVED FROM ROADS BY SHOVELING AND/OR SWEEPING AND BE TRANSPORTED TO A SEDIMENT CONTROLLED DISPOSAL AREA.

ALL CRACKED CONCRETE IN THE R/W SHALL BE REMOVED AND REPLACED TO THE NEAREST JOINT. PATCHING IS NOT ACCEPTABLE.

THE SITE CONTRACTOR SHALL HAVE A RESPONSIBLE LAND DISTURBER (RLD) CERTIFICATION.

ALL EXCAVATED MATERIAL FROM CONSTRUCTION SHALL BE DISPOSED OF IN A LAWFUL MANNER.

ALL DISTURBED AREAS SHALL BE SEEDED. (SEE SCHEDULE)

100 YR. FLOOD 7.68

TIDAL STATION UTILIZED: PORTSMOUTH NAVAL SHIPYARD
USGS QUAD SHEET: NORFOLK NORTH
NOAA CHART: 12221
TIDAL EPOCH: 1983-2001
LAT: 36° 49.3' N
LON: 79° 17.6' W

1.5X THE TIDE RANGE BETWEEN MLW AND MHW: ELEV. 2.335

MHHW	1.3104
MHW	1.1005
NAVD 88	-0.0019
MSL	-0.2709
MLW	-1.6554
MLLW	-1.7932

PROJECT DATUM
SCALE: 1/2"=1'

PREPARED FOR:

PER PROPERTIES
P.O. BOX 57008
VIRGINIA BEACH, VA. 23457
PHONE: 757-426-6824
FAX: 757-721-9071
ATTN: JIM SALMONS

PREPARED BY:

GALLUP SURVEYORS & ENGINEERS, LTD.
323 FIRST COLONIAL ROAD
VIRGINIA BEACH, VIRGINIA 23454
PHONE: 757-428-8132
FAX: 757-425-2390

PORTSMOUTH STANDARD NOTES

1. ALL CONSTRUCTION METHODS AND MATERIALS SHALL CONFORM TO THE HRPDC STANDARDS & SPECIFICATIONS AS MODIFIED BY THE PORTSMOUTH SPECIAL CONDITIONS.
2. ELEVATIONS SHOWN HEREON ARE BASED ON CITY OF PORTSMOUTH (NAV 88) DATUM.
3. ALL CONCRETE SHALL BE CLASS A3 AIR-ENTRAINED (3,000 P.S.I.).
4. TEMPORARY DRAINAGE DURING CONSTRUCTION SHALL BE PROVIDED BY THE CONTRACTOR TO RELIEVE AREAS THAT MAY CAUSE DAMAGE TO ROADWAYS.
5. PRIOR TO CONSTRUCTION OR EXCAVATION, THE CONTRACTOR SHALL ASSUME THE RESPONSIBILITY OF LOCATING ANY UNDERGROUND UTILITIES (PUBLIC OR PRIVATE) THAT MAY EXIST AND CROSS THROUGH THE AREA OF CONSTRUCTION THAT IS NOT SHOWN ON THESE PLANS. UTILITY COMPANIES SHALL BE NOTIFIED 48 HOURS IN ADVANCE OF ANY EXCAVATION IN THE PROXIMITY OF THEIR UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING, AT HIS EXPENSE, ANY EXISTING UTILITIES DAMAGED DURING CONSTRUCTION.
6. PRIOR TO CONSTRUCTION WITHIN ANY EXISTING PUBLIC RIGHT-OF-WAY, THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FROM THE CITY OF PORTSMOUTH, VIRGINIA.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING WITH MATCHING MATERIALS ANY PAVEMENT, DRIVEWAYS, WALKS, CURBS, ETC. THAT MUST BE CUT OR THAT IS DAMAGED DURING CONSTRUCTION.
8. ALL STORM SEWER PIPES, DROP INLETS, AND CURB INLETS SHALL BE CLEANED OF DEBRIS AND ERODED MATERIALS AT LAST STAGES OF CONSTRUCTION.
9. ALL SLOPES WITHIN RIGHT-OF-WAY OR IN CITY EASEMENTS SHALL BE TOP-SOILED AND SEEDED IN ACCORDANCE WITH CITY OF PORTSMOUTH SPECIFI-CATIONS.
10. PAVEMENT REPLACEMENT WITHIN THE CITY RIGHT-OF-WAY SHALL MATCH THE EXISTING PAVEMENT.
11. BEFORE YOU DIG, TO MISS THE UTILITIES, CALL MISS UTILITY OF TIDEWATER AT 811.

INDEX:

COMMONWEALTH OF VIRGINIA
DAVID R. BUTLER
LIC. No. 38395
PROFESSIONAL ENGINEER
10-2-13

DATE	REVISION

07-40 CS

G:\10-32 Salmon Portsmouth\10-32-5 e & s.dwg, 10/18/2013 8:13:31 AM, 1:60, DB

EROSION & SEDIMENT CONTROL LEGEND

- (CE) TEMPORARY STONE CONSTRUCTION ENTRANCE STANDARD & SPEC. 3.02
- (SF) SILT FENCE STANDARD & SPEC. 3.05
- (IP) INLET PROTECTION STANDARD & SPEC. 3.07 SEE DETAIL, SHEET C2

REFER TO VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK, THIRD EDITION, 1992.

THIS SHEET TO BE USED FOR EROSION AND SEDIMENT CONTROL PURPOSES ONLY

NORFOLK & PORTSMOUTH BELTLINE RAILROAD VARIABLE R/W
R/W AS DESCRIBED IN D.B. 210, PG. 149 (CHESAPEAKE)
R/W AS DESCRIBED IN D.B. 291, PG. 90
PROPOSED SHEETPILE BULKHEAD RETURN TW 10.00
INSTALL 12' X 80' (EGRESS) GRAVEL CONSTUCTION ENTRANCE W/ WASH RACK
INSTALL 12' X 80' (INGRESS) GRAVEL CONSTUCTION ENTRANCE
INSTALL 12' X 62' GRAVEL CONSTUCTION ENTRANCE
TBM PK NAIL IN PAVEMENT ELEV. 9.85
TBM PK NAIL IN PAVEMENT ELEV. 8.02
VENEER ROAD
EPA CE (OTHERS)
INSTALL SILT FENCE (SF) DENOTES CONSTRUCTION LIMITS
VIRGINIA STATE PLANE SOUTH ZONE NAD 1983 M.B. 22, P. 109, 110
NORFOLK HARBOR CHANNEL LIMITS MAINTAINED DEPTH 45'
SOUTHERN BRANCH OF THE ELIZABETH RIVER
FLOOD
EBB
SITE N/F PORTSMOUTH PORT & INDUSTRIAL COMMISSION D.B. 772 PG. 381 M.B. 22 P. 109, 110
WICK DRAIN FIELD
PROPOSED SHEETPILE BULKHEAD TW 10.00
RELOCATE EX. DITCH FLOWLINE TO WEST SIDE OF PROPOSED RETAINING WALL (SEE DETAIL)
N/F DIXXON COMPANY & DWIGHT A. DIXON D.B. 1297 PG. 713 D.B. 843 PG. 371 D.B. 770 PG. 340 D.B. 763 PG. 257 D.B. 370 PG. 368 M.B. 27 PG. 80
VENEER ROAD (40' R/W) D.B. 770 PG. 340, M.B. 27 PG. 80
NOW OR FORMERLY DIXXON COMPANY
NOW OR FORMERLY UNITED STATES OF AMERICA D.B. 611, PG. 293
337.95' (FIELD) 337.62' (PLAT) D.B. 370, PG. 372
300.14' (PLAT) D.B. 370, PG. 372
PROP. BERM (BY OTHERS)
PIERHEAD LINE (U.S. ARMY CORPS OF ENGINEERS FILE NO. C3-1-6-895)
PROVIDE 10' X 10' CHECK DAM (SEE DETAIL)
TW 10.00
PORT WARDEN LINE
PROPOSED SHEETPILE BULKHEAD RETURN TW 10.00
674.80' S85°43'23"W
THE AREA BETWEEN THE PROPOSED BERM AND THE SOUTHERN BOUNDARY LINE WILL BE FILLED, BY OTHERS, WITH THE ATLANTIC WOOD SUPERFUND PROJECT. FINAL PLANS SHOWING PROPOSED GRADES AND EROSION CONTROL ARE NOT YET COMPLETE.
FUTURE OFFSHORE SHEET PILE WALL (BY OTHERS)
S85°46'23"W 935.45'
N75°30'34"W 561.90'
ELM AVENUE STATE ROUTE NO. 337 (VARIABLE R/W) D.B. 763 PG. 257 M.B. 27 PG. 80
0' 60' 120' 180'
COMMONWEALTH OF VIRGINIA DAVID R. BUTLER Lic. No. 38395 10-2-13 PROFESSIONAL ENGINEER

DATE	COMMENT
5/22/13	ADDED CHECK DAM
5/6/13	CLIENT REVISION
2/15/13	REVISION
10/1/12	REVISION
5/3/11	CITY REVIEW
4/12/11	CITY REVIEW

REVISION SCHEDULE

EROSION AND SEDIMENT CONTROL PLAN
PORTSMOUTH TERMINAL FACILITY

PROJECT LOCATED IN: VIRGINIA BEACH, VIRGINIA
MADE FOR: PER PROPERTIES
DESIGN BY: DRB | DRAWN BY: JB | CHECKED BY: DRB
DATE: OCTOBER 2, 2013
SCALE: 1" = 60'
SHEET 2/13 C2
FILE NO.:

GALLUP SURVEYORS & ENGINEERS, LTD.
323 FIRST COLONIAL ROAD
VIRGINIA BEACH, VIRGINIA 23454
(757)428-8132 (757)425-2390 FAX

DRAINAGE STRUCTURE SCHEDULE

1A. STMH
RIM 10.50
INV 4.37

1. STMH
RIM 10.50
INV 4.24

2. STMH
RIM 10.50
INV 4.04

3. STMH
RIM 10.50
INV 3.73

4. STMH
RIM 8.20
INV (N) 3.51
INV (E) −0.14
INV (W) 2.50

5. STMH
RIM 10.20
INV −0.37

6. DI
RIM 9.40
INV (E) −0.58
INV (W) 1.87
INV (S) 3.41

7. STMH
RIM 10.50
INV −0.86

5A. DI
RIM 9.10
INV 5.09

10A. DI
RIM 9.80
INV 4.25

8. STMH
RIM 10.50
INV −1.05

10. DI
RIM 9.80
INV 4.77

11. DI
RIM 9.80
INV 3.73

12. STMH
RIM 10.40
INV 3.33

12A. DI
RIM 9.50
INV 3.13

13. DI
RIM 9.35
INV 2.49 (E,W,S)
INV 7.29 (N)

14. DI
RIM 9.35
INV 2.96

15. DI
RIM 9.35
INV 3.23

7A. DI
RIM 9.50
INV (N,S) 2.00
INV (E) 4.00

8A. RIM 9.60
INV 3.44

9A. RIM 9.35
INV 4.09

6A. RIM 9.80
INV −0.57

10−10A
208'−24" HDPE @ 0.25%
INV IN 4.77, INV OUT 4.25

10A−11
207'−24" HDPE @ 0.25%
INV IN 4.25, INV OUT 3.73

11−12
198'−24" HDPE @ 0.20%
INV IN 3.73, INV OUT 3.33

12−12A
59'−24" HDPE @ 0.34%
INV IN 3.33, INV OUT 3.13

12A−13
191'−24" HDPE @ 0.34%
INV IN 3.13, INV OUT 2.49

RR−13
117'−12" HDPE @ 1.03%
INV IN 8.50, INV OUT 7.29

9A−8A
109'−18" PERFORATED HDPE @ 0.60%
INV IN 4.09, INV OUT 3.44

15−14
89'−18" HDPE @ 0.30%
INV IN 3.23, INV OUT 2.96

14−13
196'−24" HDPE @ 0.24%
INV IN 2.96, INV OUT 2.49

13−7A
215'−18" PERFORATED HDPE @ 0.23%
INV IN 2.49, INV OUT 2.00

7A−6
344'−36" CL. IV RCP @ 0.62%
INV IN 4.00, INV OUT 1.87

8A−7A
215'−24" CL. IV RCP @ 0.67%
INV IN 3.44, INV OUT 2.00

5A−6
330'−15" HDPE @ 0.51%
INV IN 5.09, INV OUT 3.41

6−OUTLET
144' 42" HDPE @ 0.50%
INV IN −0.58, INV OUT −1.30
PROVIDE TIDEFLEX TF−1
ON OUTLET END

NOTES:

THE SILT SACK PRODUCT SHOWN ON SHEET C7 IS TO BE USED IN ALL STORM DRAIN INLETS AND IS TO REMAIN PERMANENT FOR DRAINAGE STRUCTURES 7A, 8A, 9A, AND 13.

THE INVERTS SHOWN ON THE DROP INLET DENOTES THE INVERT OF THE PIPES. PROVIDE A 12" DEEP SUMP (BELOW THE PIPE INVERT) ON THE DROP INLETS FOR MAINTENANCE PURPOSES FOR STRUCTURES 7A, 8A, 9A, AND 13.

O.W. DENOTES REQUIRED OBSERVATION WELLS; SEE DETAIL ON SHEET C9.

ALL DRAINAGE STRUCTURES ARE TO RECEIVE INLET SHAPING.

FINAL SURFACE WILL BE GRAVEL AND CRUSHED CONCRETE

PIPE SCHEDULE

4−5
150'−36" HDPE @ 0.15%
INV IN −0.14, INV OUT −0.37

5−6A
154'−36" HDPE @ 0.13%
INV IN −0.37, INV OUT −0.57

6A−7
220'−36" HDPE @ 0.13%
INV IN −0.57, INV OUT −0.86

7−8
158'−36" HDPE @ 0.12%
INV IN −0.86, INV OUT −1.05

8−OUTLET
152'−36" HDPE @ 0.12%
INV IN −1.05, INV OUT −1.23
PROVIDE TIDEFLEX TF−1
ON OUTLET END

1A−1
134'−12" HDPE @ 0.10%
INV IN 4.36, INV OUT 4.23

1−2
119'−30" HDPE @ 0.17%
INV IN 4.23, INV OUT 4.04

2−3
204'−30" HDPE @ 0.15%
INV IN 4.04, INV OUT 3.73

3−4
156'−30" HDPE @ 0.15%
INV IN 3.73, INV OUT 3.50

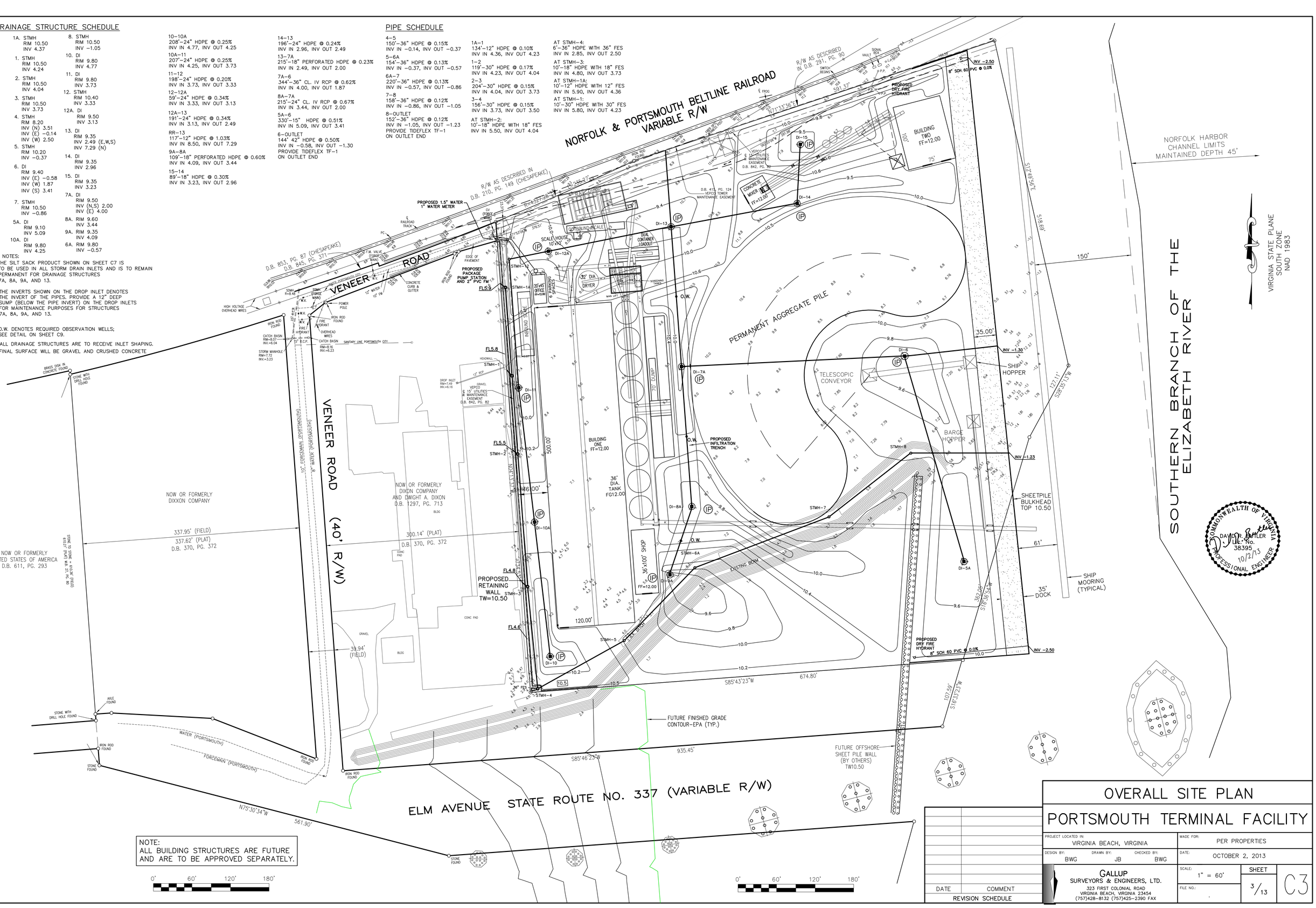
AT STMH−2:
10'−18" HDPE WITH 18" FES
INV IN 5.50, INV OUT 4.04

AT STMH−4:
6'−36" HDPE WITH 36" FES
INV IN 2.85, INV OUT 2.50

AT STMH−3:
10'−18" HDPE WITH 18" FES
INV IN 4.80, INV OUT 3.73

AT STMH−1A:
10'−12" HDPE WITH 12" FES
INV IN 5.90, INV OUT 4.36

AT STMH−1:
10'−30" HDPE WITH 30" FES
INV IN 5.80, INV OUT 4.23



NOTE:
ALL BUILDING STRUCTURES ARE FUTURE AND ARE TO BE APPROVED SEPARATELY.

0' 60' 120' 180'

0' 60' 120' 180'

COMMONWEALTH OF VIRGINIA
DAVID R. BUTLER
LIC. No. 38395
10/2/13
PROFESSIONAL ENGINEER

DATE	COMMENT

REVISION SCHEDULE

OVERALL SITE PLAN

PORTSMOUTH TERMINAL FACILITY

PROJECT LOCATED IN: VIRGINIA BEACH, VIRGINIA
MADE FOR: PER PROPERTIES
DESIGN BY: BWG DRAWN BY: JB CHECKED BY: BWG
DATE: OCTOBER 2, 2013
SCALE: 1" = 60'
SHEET 3/13
FILE NO.: .
C3

GALLUP
SURVEYORS & ENGINEERS, LTD.
323 FIRST COLONIAL ROAD
VIRGINIA BEACH, VIRGINIA 23454
(757)428-8132 (757)425-2390 FAX

PIPE SCHEDULE

10–10A
208'–24" HDPE @ 0.25%
INV IN 4.77, INV OUT 4.25

10A–11
207'–24" HDPE @ 0.25%
INV IN 4.25, INV OUT 3.73

11–12
198'–24" HDPE @ 0.20%
INV IN 3.73, INV OUT 3.33

12–12A
59'–24" HDPE @ 0.34%
INV IN 3.33, INV OUT 3.13

12A–13
191'–24" HDPE @ 0.34%
INV IN 3.13, INV OUT 2.49

RR–13
117'–12" HDPE @ 1.03%
INV IN 8.50, INV OUT 7.29

9A–8A
109'–18" PERFORATED HDPE @ 0.60%
INV IN 4.09, INV OUT 3.44

15–14
89'–18" HDPE @ 0.30%
INV IN 3.23, INV OUT 2.96

14–13
196'–24" HDPE @ 0.24%
INV IN 2.96, INV OUT 2.49

13–7A
215'–18" PERFORATED HDPE @ 0.23%
INV IN 2.49, INV OUT 2.00

7A–6
344'–36" CL. IV RCP @ 0.62%
INV IN 4.00, INV OUT 1.87

8A–7A
215'–24" CL. IV RCP @ 0.67%
INV IN 3.44, INV OUT 2.00

5A–6
330'–15" HDPE @ 0.51%
INV IN 5.09, INV OUT 3.41

6–OUTLET
144' 42" HDPE @ 0.50%
INV IN –0.58, INV OUT –1.30
PROVIDE TIDEFLEX TF–1
ON OUTLET END

4–5
150'–36" HDPE @ 0.15%
INV IN –0.14, INV OUT –0.37

5–6A
154'–36" HDPE @ 0.13%
INV IN –0.37, INV OUT –0.57

6A–7
220'–36" HDPE @ 0.13%
INV IN –0.57, INV OUT –0.86

7–8
158'–36" HDPE @ 0.12%
INV IN –0.86, INV OUT –1.05

8–OUTLET
152'–36" HDPE @ 0.12%
INV IN –1.05, INV OUT –1.23
PROVIDE TIDEFLEX TF–1
ON OUTLET END

1A–1
134'–12" HDPE @ 0.10%
INV IN 4.36, INV OUT 4.23

1–2
119'–30" HDPE @ 0.17%
INV IN 4.23, INV OUT 4.04

2–3
204'–30" HDPE @ 0.15%
INV IN 4.04, INV OUT 3.73

3–4
156'–30" HDPE @ 0.15%
INV IN 3.73, INV OUT 3.50

AT STMH–2:
10'–18" HDPE WITH 18" FES
INV IN 5.50, INV OUT 4.04

AT STMH–4:
6'–36" HDPE WITH 36" FES
INV IN 2.85, INV OUT 2.50

AT STMH–3:
10'–18" HDPE WITH 18" FES
INV IN 4.80, INV OUT 3.73

AT STMH–1A:
10'–12" HDPE WITH 12" FES
INV IN 5.90, INV OUT 4.36

AT STMH–1:
10'–30" HDPE WITH 30" FES
INV IN 5.80, INV OUT 4.23

NORFOLK & PORTSMOUTH BELTLINE RAILROAD
VARIABLE R/W

R/W AS DESCRIBED IN D.B. 291, PG. 90

VEPCO
℄ 15' UTILITIES & MAINTENANCE EASEMENT
D.B. 842, PG. 82

℄ FROG

SIGNAL BOX

VAULT

SWITCH BEGINS

N71°33'36"E 591.37'

FIBER OPTIC WITNESS POST

IRON ROD FOUND

S62°20'06"W 291.98'

℄ RR TRACKS

D.B. 415, PG. 124
VEPCO TOWER MAINTENANCE EASEMENT

R/W AS DESCRIBED IN D.B. 210, PG. 149 (CHESAPEAKE)

R=4327.28'

S71°53'06"W 376.51'

PROPOSED 1.5" WATER
1" WATER METER

GV (FORCE MAIN)

W.V.

RAIL DUMP

OUTBOUND SCALE

SCALE HOUSE
10'x10'

DI–12A

EDGE OF PAVEMENT

STMH–12

PROPOSED PACKAGE PUMP STATION AND 2" PVC FM

FL5.9

20'x45' OFFICE
FF=12.00

6 PARKING SPACES

32' DIA DRYER

DUAL CONTAINER LOADOUT

SCREENING TANKS

MAN LIFT

INBOUND SCALE

NOW OR FORMERLY
DIXON COMPANY
AND DWIGHT A. DIXON
D.B. 1297, PG. 713

STMH–1A

REGRADE DITCH
SEE DETAIL, SHT. C7

PROVIDE 3 S.Y.
OF EC–1 STONE
OVER FILTER FABRIC

FL5.8

INV.=5.97

HEADWALL

DROP INLET
RIM=7.49
INV.=6.16

12" RCP

STMH–1

GRAVEL

WELL

CONCRETE MIXER
FF=12.00

DI–14

DI–13

3" PVC

DI–15

BUILDING TWO
FF=12.00

100'

75'

BARGE HOPPER

PROPOSED INFILTRATION TRENCH

PERMANENT AGGREGATE PILE

70' DUMP

DI–7A

TELESCOPIC CONVEYOR

DI–6

INV –1.30

35.00'

SHIP HOPPER

35' DOCK

SHEETPILE BULKHEAD TOP 10.50 (BY OTHERS)

CONCRETE SURFACE

INV –2.50

8" SCH 60 PVC @ 0.0%

PROPOSED DRY FIRE HYDRANT

SHIP MOORING (TYPICAL)

S12°49'56"E 518.69'

SOUTHERN BRANCH OF THE ELIZABETH RIVER

VIRGINIA STATE PLANE
SOUTH ZONE
NAD 1983

MATCH LINE SEE SHEET C5

DRAINAGE STRUCTURE SCHEDULE

1A. STMH
RIM 10.50
INV 4.36

1. STMH
RIM 10.50
INV 4.23

2. STMH
RIM 10.50
INV 4.04

3. STMH
RIM 10.50
INV 3.73

4. STMH
RIM 8.20
INV (N) 3.50
INV (E) –0.14
INV (W) 2.50

5. STMH
RIM 10.20
INV –0.37

6. DI
RIM 9.40
INV (E) –0.58
INV (W) 1.87
INV (S) 3.41

7. STMH
RIM 10.50
INV –0.86

5A. DI
RIM 9.10
INV 5.09

10A. DI
RIM 9.80
INV 4.25

8. STMH
RIM 10.50
INV –1.05

10. DI
RIM 9.80
INV 4.77

11. DI
RIM 9.80
INV 3.73

12. STMH
RIM 10.40
INV 3.33

12A. DI
RIM 9.50
INV 3.13

13. DI
RIM 9.35
INV 2.49 (E,W,S)
INV 7.29 (N)

14. DI
RIM 9.35
INV 2.96

15. DI
RIM 9.35
INV 3.23

7A. DI
RIM 9.50
INV (N,S) 2.00
INV (E) 4.00

8A. RIM 9.60
INV 3.44

9A. RIM 9.35
INV 4.09

6A. RIM 9.80
INV –0.57

NOTES:
THE SILT SACK PRODUCT SHOWN ON SHEET C7 IS TO BE USED IN ALL STORM DRAIN INLETS AND IS TO REMAIN PERMANENT FOR DRAINAGE STRUCTURES 7A, 8A, 9A, AND 13.

THE INVERTS SHOWN ON THE DROP INLET DENOTES THE INVERT OF THE PIPES. PROVIDE A 12" DEEP SUMP (BELOW THE PIPE INVERT) ON THE DROP INLETS FOR MAINTENANCE PURPOSES FOR STRUCTURES 7A, 8A, 9A, AND 13.

O.W. DENOTES REQUIRED OBSERVATION WELLS; SEE DETAIL ON SHEET C9.

ALL DRAINAGE STRUCTURES ARE TO RECEIVE INLET SHAPING.

SURFACE AREA OF THE SITE WILL BE GRAVEL

0' 30' 60' 90'

COMMONWEALTH OF VIRGINIA
DAVID R. BUTLER
LIC. No. 38395
10/2/13
PROFESSIONAL ENGINEER

GRADING PLAN AND UTILITY PLAN
PORTSMOUTH TERMINAL FACILITY

PROJECT LOCATED IN: VIRGINIA BEACH, VIRGINIA
MADE FOR: PER PROPERTIES
DESIGN BY: BWG DRAWN BY: JB CHECKED BY: BWG
DATE: OCTOBER 2, 2013
SCALE: 1" = 30'
SHEET 4/13 C4
FILE NO.: .

GALLUP
SURVEYORS & ENGINEERS, LTD.
323 FIRST COLONIAL ROAD
VIRGINIA BEACH, VIRGINIA 23454
(757)428–8132 (757)425–2390 FAX

G:\10-33 Saltgon Portsmouth\10-33-5 e & s.dgn 10/18/2013 8:38:27 AM 1:30 JB

MATCH LINE SEE SHEET C4

VEPCO
℄ 15' UTILITIES
& MAINTENANCE
EASEMENT
D.B. 842, PG. 82

DI-11

FL5.5

STMH-2

500.00'

N04°13'37"W

734.53'

4.0'

46.0'

BUILDING
ONE
FF=12.00

36' DIA. TANK
(TYP.)
FG BASE 12.00

DI-10A

DI-8A

O.W.

PROPOSED
INFILTRATION
TRENCH

36'x100' SHOP
FF=12.00

120.00'

STMH-6A

DI-9A

EXISTING BERM

STMH-7

EX. DITCH

STMH-8

INV -1.23

BARGE
HOPPER

DI-5A

SHEETPILE
BULKHEAD
TOP 10.50
(BY OTHERS)

61'

CONCRETE
SURFACE

SHIP
MOORING
(TYPICAL)

35'
DOCK

SOUTHERN BRANCH OF THE
ELIZABETH RIVER

VIRGINIA STATE PLANE
SOUTH ZONE
NAD 1983

127.11'
S26°35'13"W

FL4.8

PROPOSED
RETAINING
WALL
TW=10.50

STMH-3

CONC PAD

FL4.6

STMH-5

DI-10

PROVIDE 3 S.Y.
OF EC-1 STONE
OVER FILTER FABRIC

36" FES

STMH-4

THE AREA BETWEEN THE PROPOSED BERM AND
THE SOUTHERN BOUNDARY LINE WILL BE FILLED,
BY OTHERS, WITH THE ATLANTIC WOOD SUPERFUND
PROJECT.

FUTURE FINISHED GRADE
CONTOUR-EPA (TYP.)

S85°46'23"W 935.45

S85°43'23"W 674.80'

362.05'
S16°36'54"W

8" SCH 60 PVC @ 0.0%

INV -2.50

PROPOSED
DRY FIRE
HYDRANT

107.59'
S16°33'23"W

FUTURE OFFSHORE
SHEET PILE WALL
(BY OTHERS)
TW10.50

ELM AVENUE STATE ROUTE NO. 337 (VARIABLE R/W)

0' 30' 60' 90'

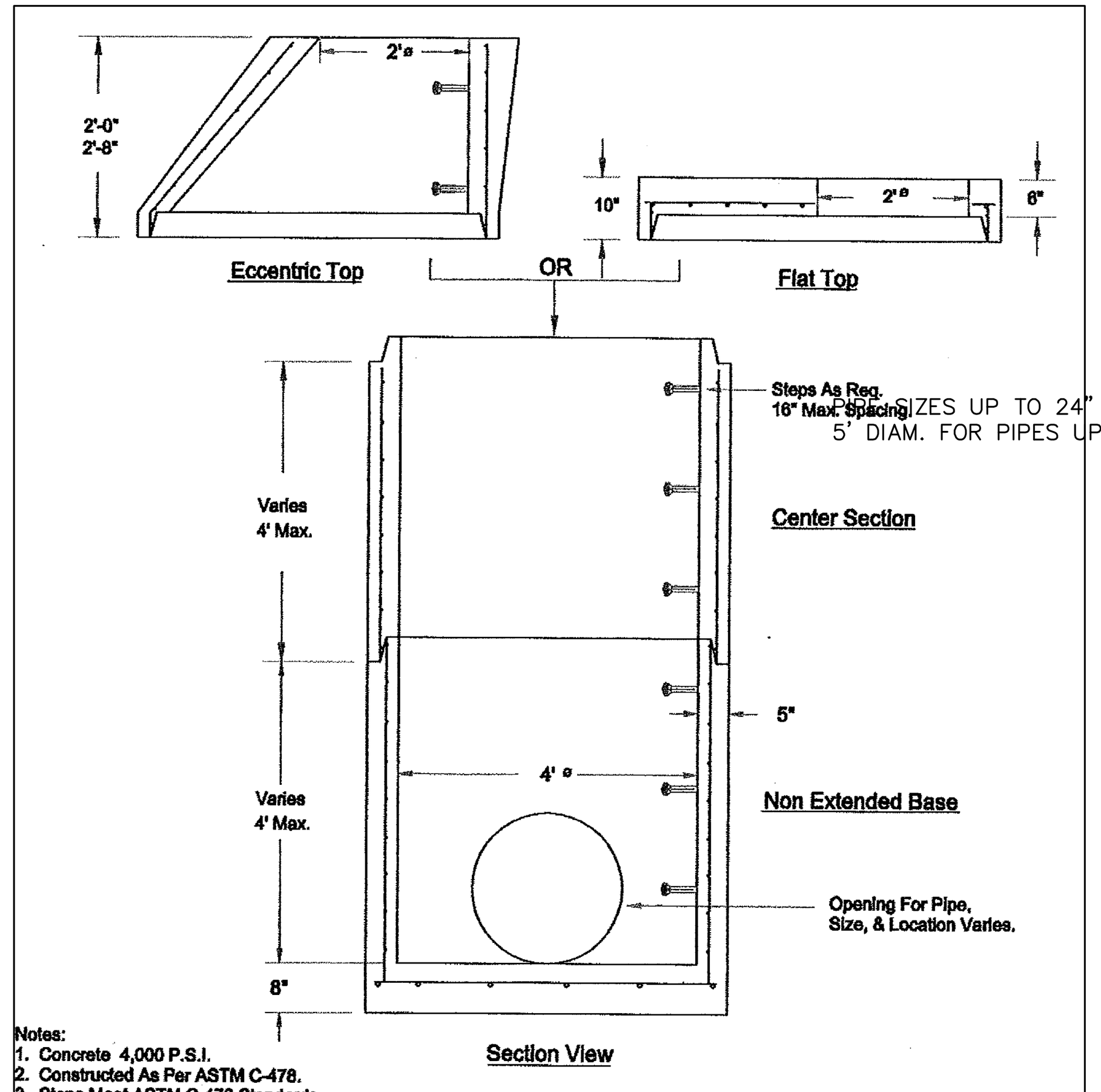
COMMONWEALTH OF VIRGINIA
DAVID R. BUTLER
Lic. No.
38395
10/2/13
PROFESSIONAL ENGINEER

GRADING PLAN AND UTILITY PLAN
PORTSMOUTH TERMINAL FACILITY

PROJECT LOCATED IN: VIRGINIA BEACH, VIRGINIA	MADE FOR: PER PROPERTIES
DESIGN BY: BWG DRAWN BY: JB CHECKED BY: BWG	DATE: OCTOBER 2, 2013

GALLUP
SURVEYORS & ENGINEERS, LTD.
323 FIRST COLONIAL ROAD
VIRGINIA BEACH, VIRGINIA 23454
(757)428-8132 (757)425-2390 FAX

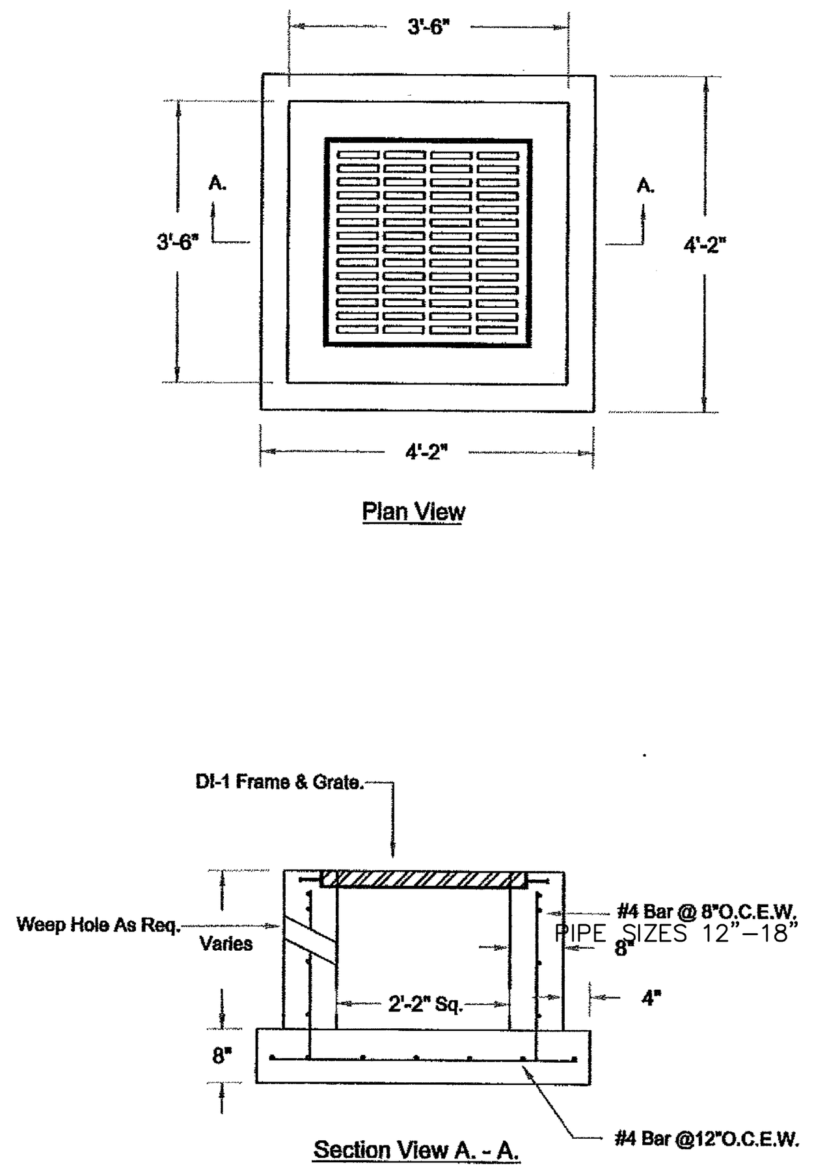
SCALE: 1" = 30'
FILE NO.: .
SHEET 5/13
C5



Notes:
1. Concrete 4,000 P.S.I.
2. Constructed As Per ASTM C-478.
3. Steps Meet ASTM C-478 Standards.
4. Reinforcement Designed As Per ASTM C-478.
5. Rebar Meets ASTM A-615, Grade 60.
6. Reinforcing Wire Meets ASTM A-82.
7. Butyl Joints Meet ASTM C-990.

NPCC
NANSEMOND PRE-CAST CONCRETE CO., INC.
3737 Nansemond Parkway - Suffolk, VA. 23435

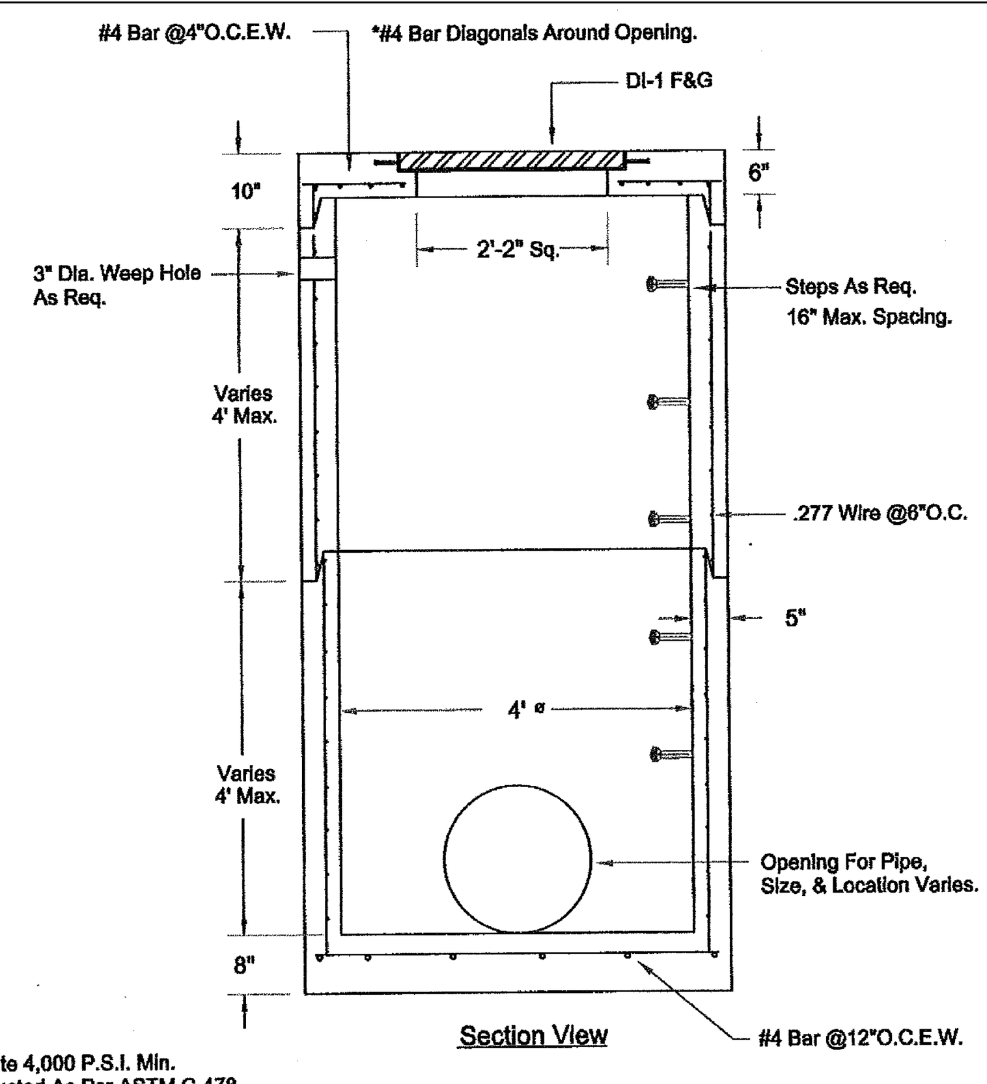
Storm Drain Manhole 48" Dia. W/24" Dia. Opening.
Drawing #: 48-SD-24-MH
Scale: 1/2" = 1'
Contractor Approval:



Notes:
1. Concrete 4,000 P.S.I. Min.
2. All Rebar Meets ASTM A-615, Grade 60.

NPCC
NANSEMOND PRE-CAST CONCRETE CO., INC.
3737 Nansemond Parkway - Suffolk, VA. 23435

DI-1 Structure Shallow
Drawing #: DI-1 SH
No Scale
Contractor Approval:

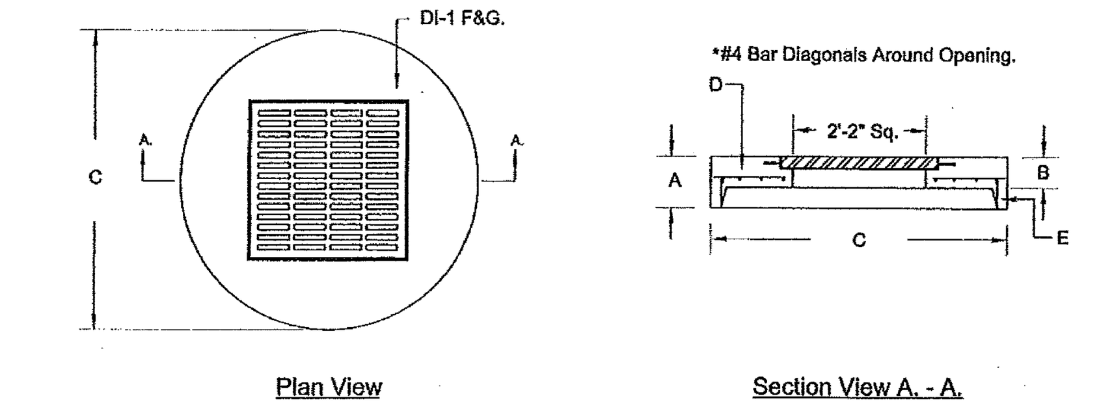


Notes:
1. Concrete 4,000 P.S.I. Min.
2. Constructed As Per ASTM C-478.
3. Steps Meet ASTM C-478.
4. Butyl Joints Meet ASTM C-990.
5. All Rebar Meets ASTM A-615, Grade 60.
6. Reinforcing Wire Meets ASTM A-82.

NPCC

DI-1 Storm Drain Manhole 48" Dia.

PIPE SIZES 12"-24"



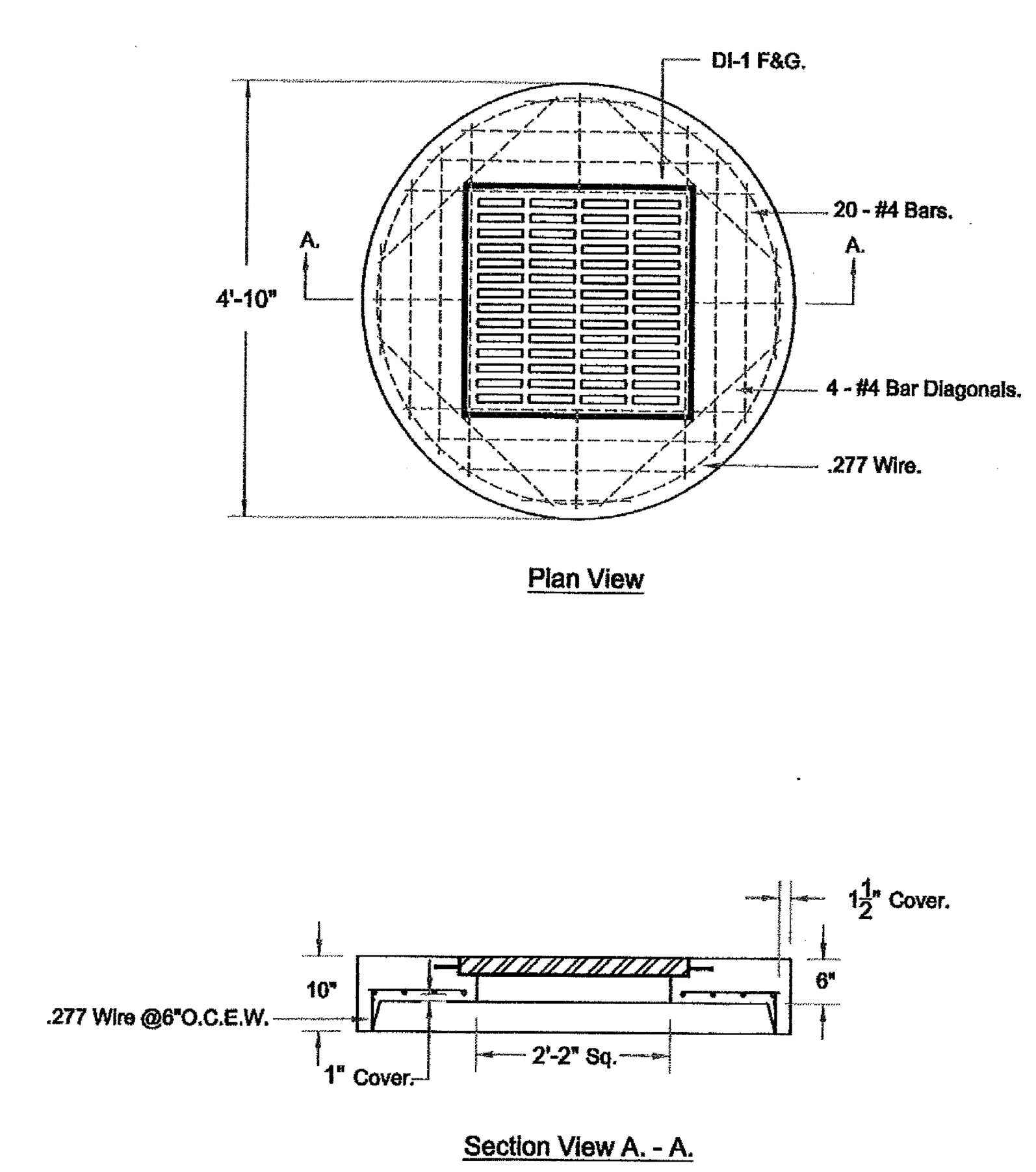
		48" Dia. Flat Top W/DI-1	60" Dia. Flat Top W/DI-1	72" Dia. Flat Top W/DI-1
A	Overall Thickness	10"	12-3/4"	13"
B	Slab Thickness	6"	8"	8"
C	Outside Diameter	58"	72"	86"
D	Rebar	#4 Bar @4" O.C.E.W.	#4 Bar @4" O.C.E.W.	#4 Bar @4" O.C.E.W.
E	Wire In Walls	.277 Wire @6"O.C.	.277 Wire @4-3/4"O.C.	.277 Wire @3-3/4"O.C.
	Weight W/Grate	1570#	2985#	4500#

		84" Dia. Flat Top W/DI-1
A	Overall Thickness	13"
B	Slab Thickness	8"
C	Outside Diameter	100"
D	Rebar	#4 Bar @4" O.C.E.W.
E	Wire In Walls	.277 Wire @3-1/4"O.C.
	Weight W/Grate	5900#

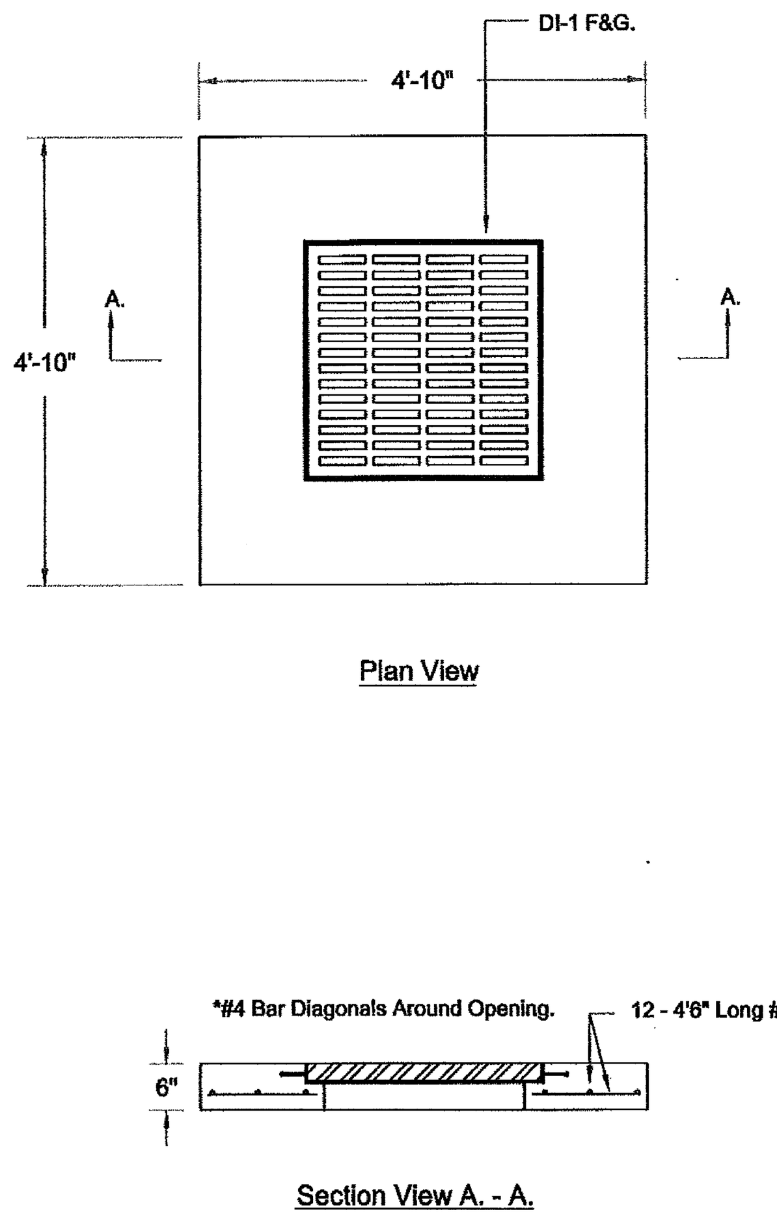
Notes:
1. Concrete 4,000 P.S.I. Min.
2. Constructed As Per ASTM C-478.
3. Butyl Joints Meet ASTM C-990 Standards.
4. All Rebar Meets ASTM A-615, Grade 60.

NPCC
NANSEMOND PRE-CAST CONCRETE CO., INC.

Flat Top Chart DI-1 Opening For 48" Dia. - 84" Dia.
Drawing #: FT-DI-1-CH-48-84
No Scale
Contractor Approval:

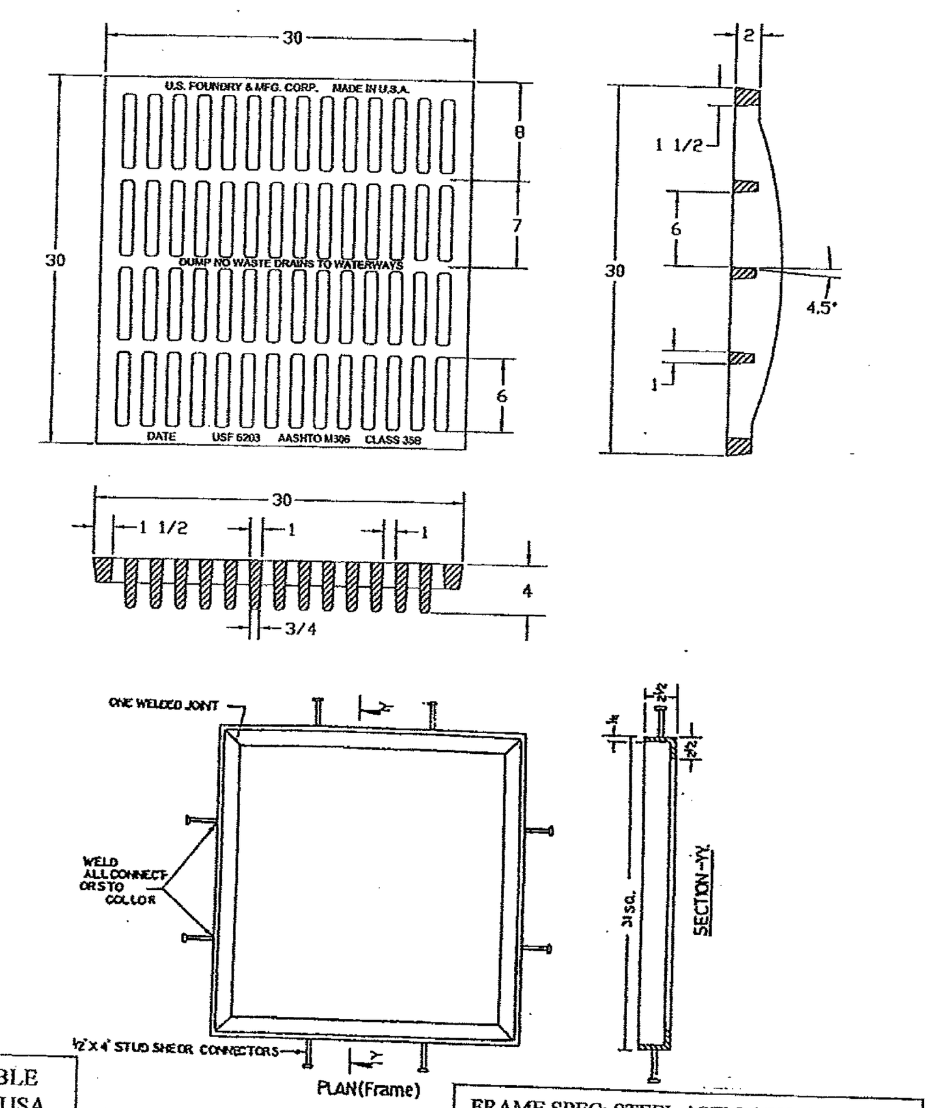


Notes:
1. Concrete 4,000 P.S.I. Min.
2. Constructed As Per ASTM C-478.
3. Reinforcing Designed As Per ASTM C-478 & ACI 318.
4. Rebar Meets ASTM A-615, Grade 60.
5. Reinforcing Wire Meets ASTM A-82.
6. Butyl Joints Meet ASTM C-990.



Notes:
1. Concrete 4,000 P.S.I. Min.
2. All Reabr Meets ASTM A-615, Grade 60.

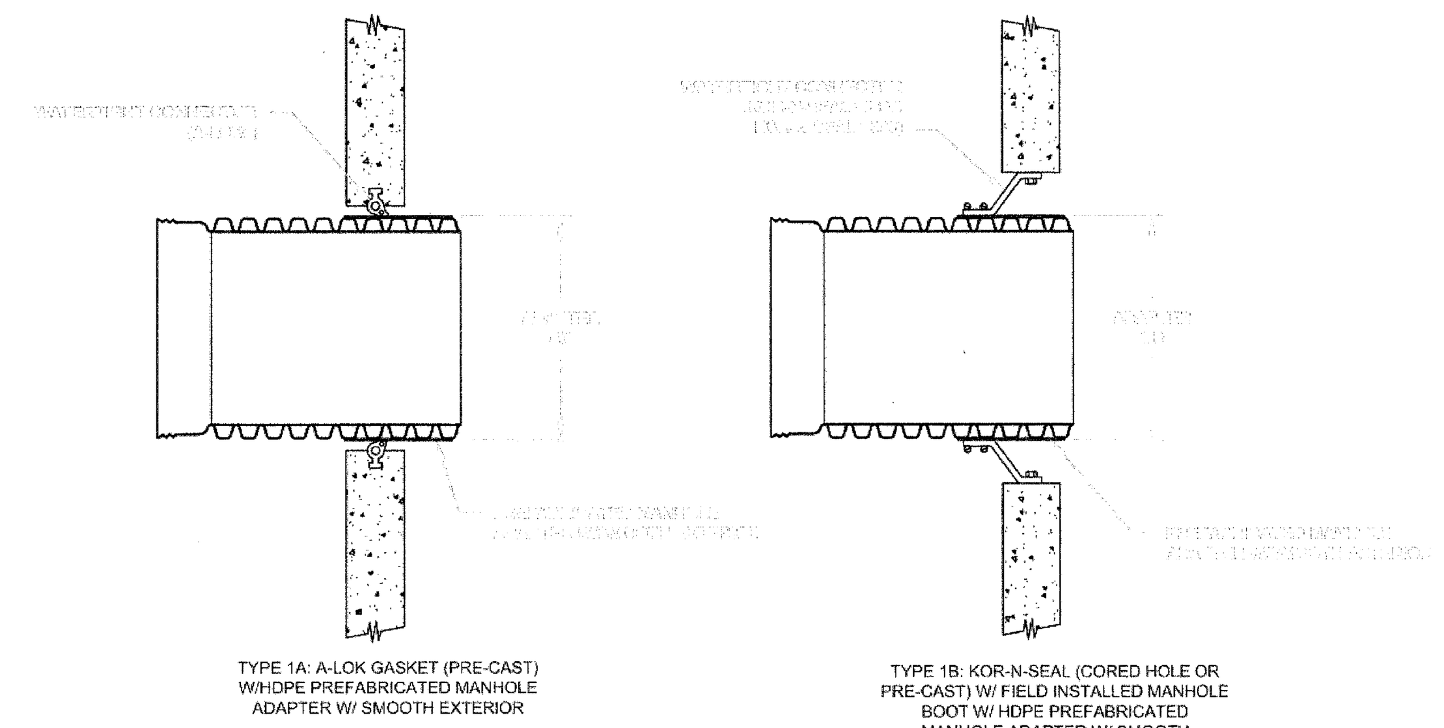
CAPITOL FOUNDRY OF VA, INC.
2856 CRUSADER CIRCLE
VIRGINIA BEACH, VA 23453
PHONE: (757) 427-9431
FAX: (757) 427-9308
EMAIL: capitolfoundry@hotmail.com



AVAILABLE MADE IN USA

FRAME SPEC: STEEL ASTM-A709 GRADE 36
GALVANIZING SPEC: ASTM-A123

VDOT DI-1 30" X 30" GRATE & GALV. STEEL FRAME
MATERIAL SPEC: GRAY IRON ASTM-A48 CLASS 35B
ITEM #DI-1*GF



TYPE 1A: A-LOK GASKET (PRE-CAST) W/HDPE PREFABRICATED MANHOLE ADAPTER W/ SMOOTH EXTERIOR

TYPE 1B: KOR-N-SEAL (CORED HOLE OR PRE-CAST) W/ FIELD INSTALLED MANHOLE BOOT W/ HDPE PREFABRICATED MANHOLE ADAPTER W/ SMOOTH EXTERIOR

SEE STANDARD DETAIL STD-201 AND TECHNICAL NOTE: 5.04 HDPE CONNECTIONS TO MANHOLES AND STRUCTURES FOR INSTALLATION RECOMMENDATIONS.

PIPE SIZE	ADAPTER OD (IN)		ADS PRODUCT CODES		KOR-N-SEAL® **		A-LOK RING® **	
(IN)	A-PROFILE	H-PROFILE	A-PROFILE	H-PROFILE	SERIES I OR II	SERIES 306	A-PROFILE	H-PROFILE
12	14.73	14.45	1222ANB	1222ANBH	S106-20BWS	N/A	480	475
15	17.98	18.05	1522ANB	1522ANBH	S106-20WS	S306-22	580	580
18	21.71	22.0	1822ANB	1822ANBH	S206-26	S306-26	710	710
24	28.52	28.9	2422ANB	2422ANBH	S206-32	S306-32	915	930
30	35.92	36.0	3022ANB	3022ANBH	S206-40	S306-40	1180	1180
36	42.06	42.15	3622ANB	3622ANBH	S206-46	S306-46	1350	1360
42	48.54	48.75	4222ANB	4222ANBH	S206-52L	S306-52L	1560	1570
48	54.53	55.75	4822ANB	4822ANBH	S206-58L	S306-58L	1745	1790
54	N/A	61.75	N/A	CUSTOM	S206-64L	N/A	1940	1940
60	67.3	68.05	6022ANB	6022ANBH	S206-72	N/A	2170	2170

NOTES:

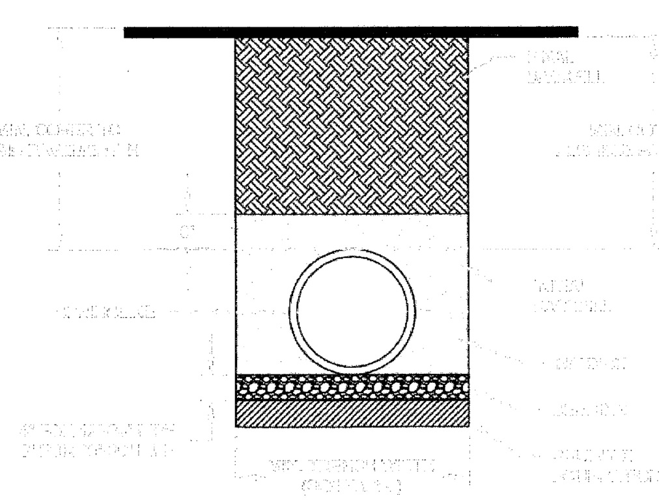
PERFORMANCE HIGHLY DEPENDENT ON INSTALLATION. CONTRACTOR MUST INSURE MANHOLE GASKET IS UNIFORMLY SEATED AROUND STRUCTURE ADAPTER. EXTRA PRECAUTIONS MUST BE TAKEN TO PREVENT DIFFERENTIAL SETTLEMENT BETWEEN THE PIPE AND MANHOLE.

** THIRD PARTY - CODES AS SUPPLIED BY MANUFACTURER

KOR-N-SEAL is a registered trademark of NPC, Inc. (www.npc.com)
A-LOK is a registered trademark of A-LOK Products, Inc. (www.a-lok.com)

2	UPDATED ADAPTER OD	CKS	7/13/07	
REV.	DESCRIPTION	BY	MM/DD/YY	CHK'D

WATERTIGHT STRUCTURE CONNECTION TYPE 1 DETAIL
DRAWING NUMBER: STD-204A
ADS ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OHIO 43026
CKS | 10/10/06 | NTS | 1 OF 1



NOTES:

1. ALL PIPE SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321, "STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY FLOW APPLICATIONS", LATEST ADDITION

2. MEASURES SHOULD BE TAKEN TO PREVENT MIGRATION OF NATIVE FINES INTO BACKFILL MATERIAL, WHEN REQUIRED.

3. FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH SUITABLE MATERIAL AS SPECIFIED BY THE ENGINEER. AS AN ALTERNATIVE AND AT THE DISCRETION OF THE DESIGN ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING A GEOTEXTILE MATERIAL.

4. BEDDING: SUITABLE MATERIAL SHALL BE CLASS I, II OR III. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. UNLESS OTHERWISE NOTED BY THE ENGINEER, MINIMUM BEDDING THICKNESS SHALL BE 4" (100mm) FOR 4"-24" (100mm-600mm); 6" (150mm) FOR 30"-60" (750mm-900mm).

5. INITIAL BACKFILL: SUITABLE MATERIAL SHALL BE CLASS I, II OR III IN THE PIPE ZONE EXTENDING NOT LESS THAN 6" ABOVE CROWN OF PIPE. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. MATERIAL SHALL BE INSTALLED AS REQUIRED IN ASTM D2321, LATEST EDITION.

6. MINIMUM COVER: MINIMUM COVER, H, IN NON-TRAFFIC APPLICATIONS (GRASS OR LANDSCAPE AREAS) IS 12" FROM THE TOP OF PIPE TO GROUND SURFACE. ADDITIONAL COVER MAY BE REQUIRED TO PREVENT FLOATION. FOR TRAFFIC APPLICATIONS, MINIMUM COVER, H, IS 12" UP TO 48" DIAMETER PIPE AND 24" OF COVER FOR 54"-60" DIAMETER PIPE, MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TO TOP OF RIGID PAVEMENT.

RECOMMENDED MINIMUM TRENCH WIDTHS

PIPE DIAM.	MIN. TRENCH WIDTH
4"	21"
6"	23"
8"	26"
10"	28"
12"	30"
15"	34"
18"	39"
24"	48"
30"	56"
36"	64"
42"	72"
48"	80"
54"	88"
60"	96"

MINIMUM RECOMMENDED COVER BASED ON VECHICLE LOADING CONDITIONS

	SURFACE LIVE LOADING CONDITION	
PIPE DIAM.	H-25	HEAVY CONSTRUCTION (75T AXLE LOAD) *
12" - 48"	12"	48"
54" - 60"	24"	60"

* VEHICLES IN EXCESS OF 75T MAY REQUIRE ADDITIONAL COVER

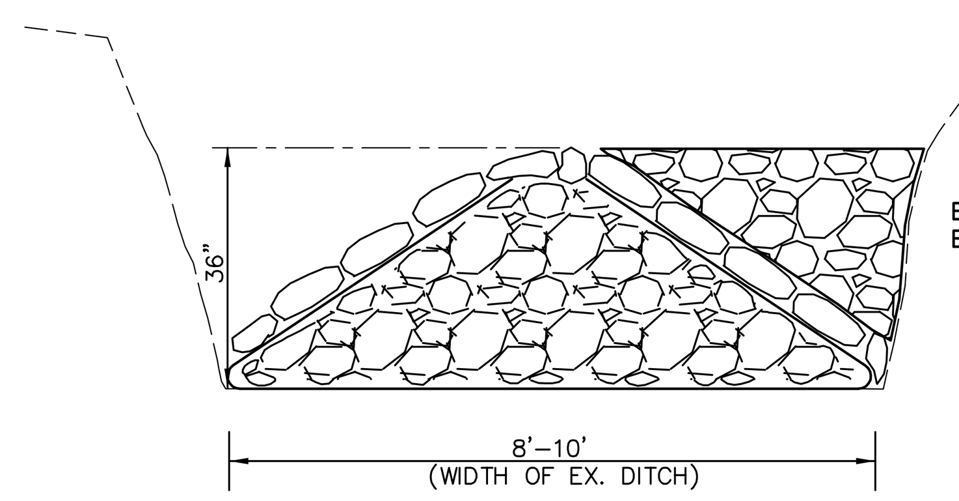
MINIMUM RECOMMENDED COVER BASED ON RAILWAY LOADING CONDITIONS

PIPE DIAM.	COOPER E-80**
UP TO 24"	24"
30"-36"	36"
42"-60"	48"

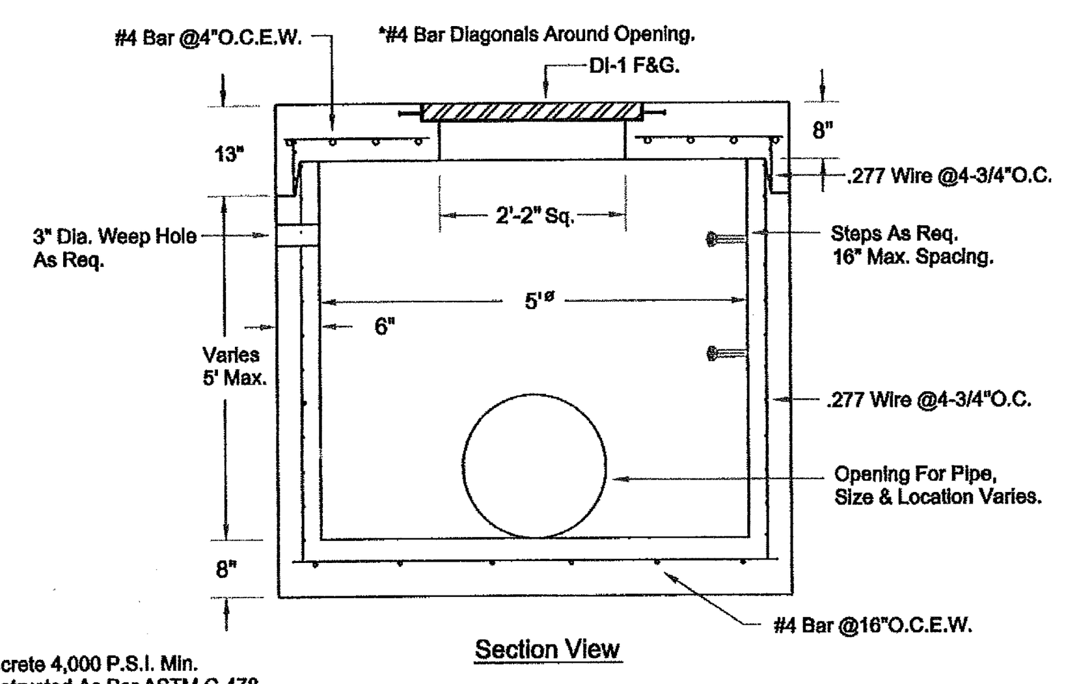
** COVER IS MEASURED FROM TOP OF PIPE TO BOTTOM OF RAILWAY TIE.
*** E-80 COVER REQUIREMENTS, ARE ONLY APPLICABLE TO ASTM F 2306 PIPE.

2	ADDED E-80 INFORMATION	TJR	08/20/07	
REV.	DESCRIPTION	BY	MM/DD/YY	CHK'D

TYPICAL TRENCH DETAIL
DRAWING NUMBER STD-101
ADS ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OHIO 43026
CKS | 10/18/06 | NTS | 1 OF 1

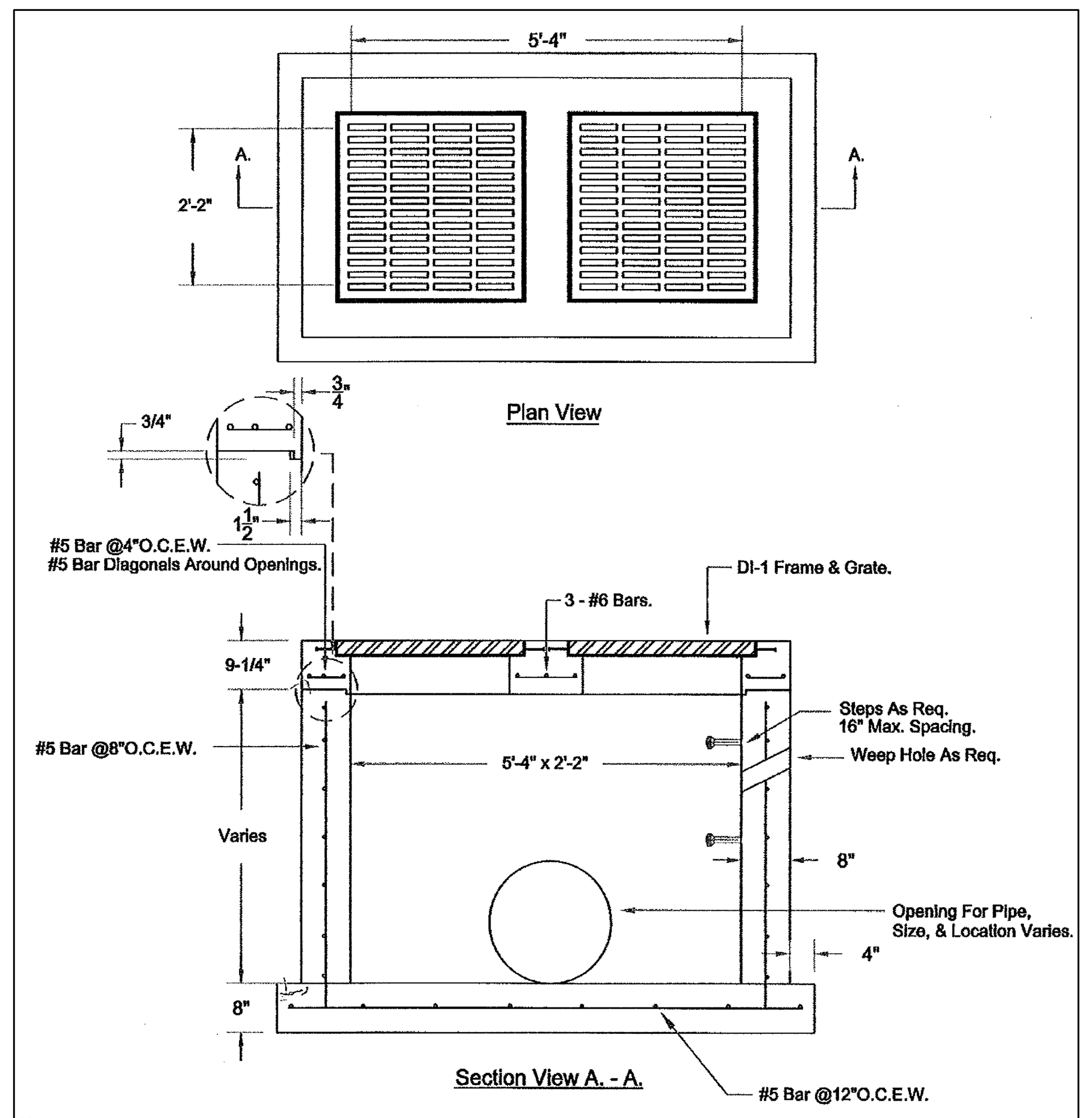


DETAIL OF CHECK DAM AT SW CORNER OF SITE
NO SCALE



Notes:
1. Concrete 4,000 P.S.I. Min.
2. Constructed As Per ASTM C-478.
3. Steps Meet ASTM C-478.
4. Butyl Joints Meet ASTM C-990.
5. All Rebar Meets ASTM A-615, Grade 60.
6. Reinforcing Wire Meets ASTM A-82.

PIPE SIZES UP TO 36"



Notes:
1. Concrete 4,000 P.S.I. Min.
2. All Rebar Meets ASTM A-615, Grade 60.

COMMONWEALTH OF VIRGINIA
DAVID R. BUTLER
Lic. No. 38395
10-2-13
PROFESSIONAL ENGINEER

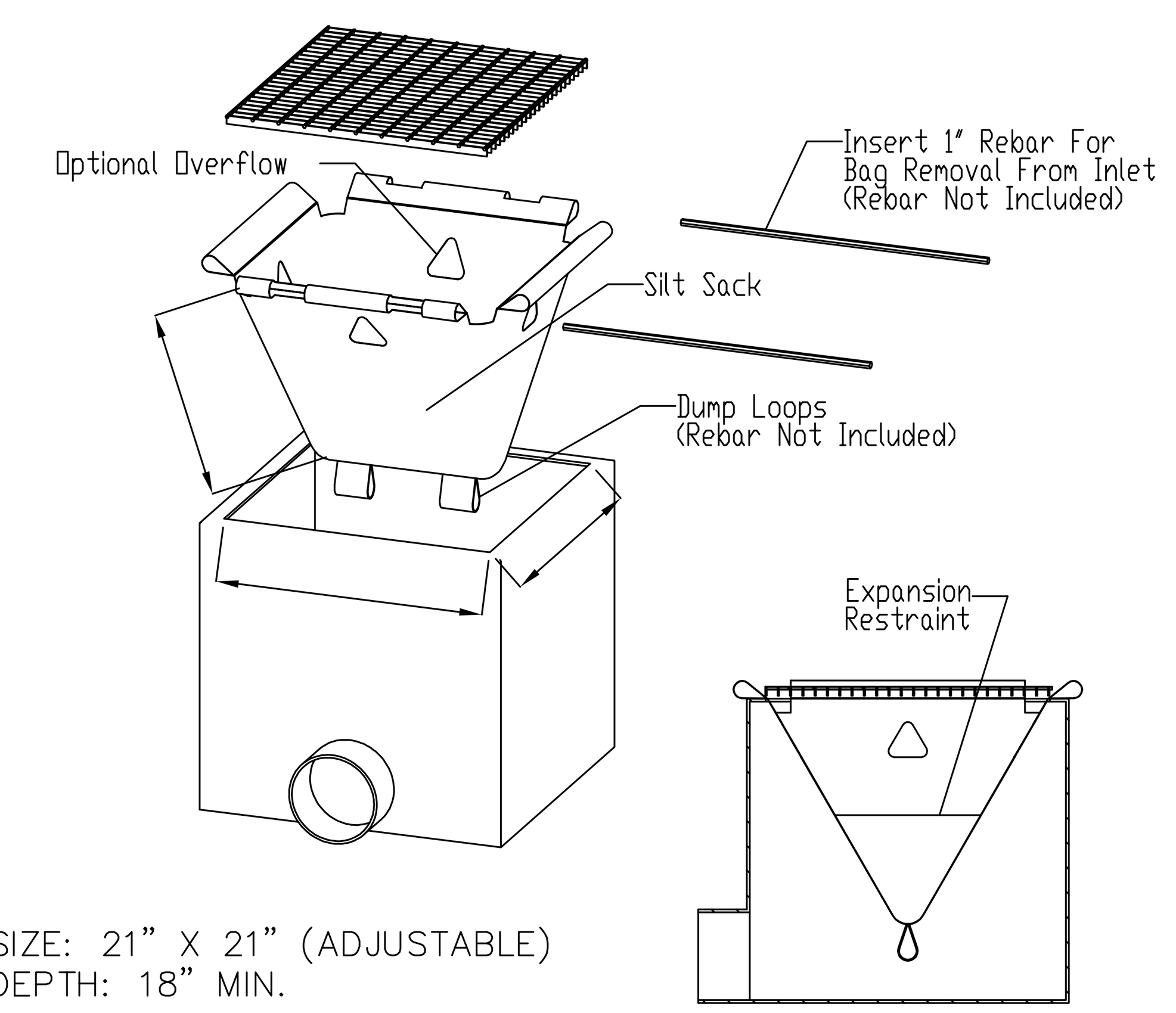
DATE	COMMENT
REVISION SCHEDULE	

DRAINAGE DETAILS AND NOTES
PORTSMOUTH TERMINAL FACILITY

PROJECT LOCATED IN: VIRGINIA BEACH, VIRGINIA			MADE FOR: PER PROPERTIES	
DESIGN BY: DRB	DRAWN BY: JB	CHECKED BY: DRB	DATE: OCTOBER 2, 2013	
GALLUP SURVEYORS & ENGINEERS, LTD. 323 FIRST COLONIAL ROAD VIRGINIA BEACH, VIRGINIA 23454 (757)428-8132 (757)425-2390 FAX			SCALE: N/A	SHEET 6/13 C6
			FILE NO.:	

SILTSACK DETAIL

Silt Sack - Type A



SIZE: 21" X 21" (ADJUSTABLE)
DEPTH: 18" MIN.
CONFIRM SIZE WITH MANUFACTURER PRIOR TO ORDERING

MAINTENANCE SCHEDULE FOR SILTSACK:

1. EACH SILTSACK SHOULD BE INSPECTED AFTER EVERY MAJOR STORM EVENT
2. IF THERE HAVE BEEN NO MAJOR STORM EVENTS, SILTSACK SHOULD BE INSPECTED EVERY 2-3 WEEKS.
3. THE YELLOW RESTRAINT CORD SHOULD BE VISIBLE AT ALL TIMES. IF THE CORD IS COVERED WITH SEDIMENT, THE SILTSACK SHOULD BE EMPLIED.

SUPPLIER:
ACF ENVIRONMENTAL, INC.
2831 CARDWELL ROAD
RICHMOND, VA. 23234
PH. 800-448-3636

3.0 Construction Sequence

3.1 General

3.1.1 To install Siltsack in the catch basin, remove the grate and place the sack in the opening. Hold approximately six inches of the sack outside the frame. This is the area of the lifting straps. Replace the grate to hold the sack in place.

3.1.2 When the restraint cord is no longer visible, Siltsack is full and should be emptied.

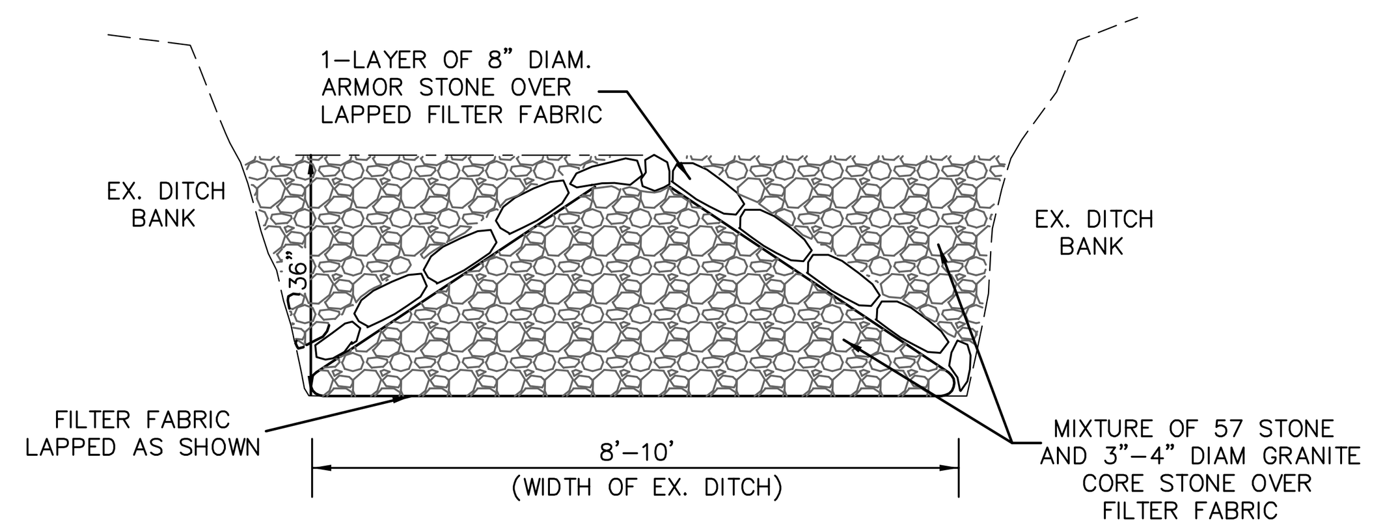
3.1.3 To remove Siltsack, take two pieces of 1" diameter rebar and place through the lifting loops on each side of the sack to facilitate the lifting of Siltsack.

3.1.4 To empty Siltsack, place unit where the contents will be collected. Place the rebar through the lift straps (connected to the bottom of the sack) and lift. This will lift Siltsack from the bottom and empty the contents. Clean out and rinse. Return Siltsack to its original shape and place back in the basin.

3.1.5 Siltsack is reusable. Once the construction cycle is complete, remove Siltsack from the basin and clean. Siltsack should be stored out of sunlight until next use.

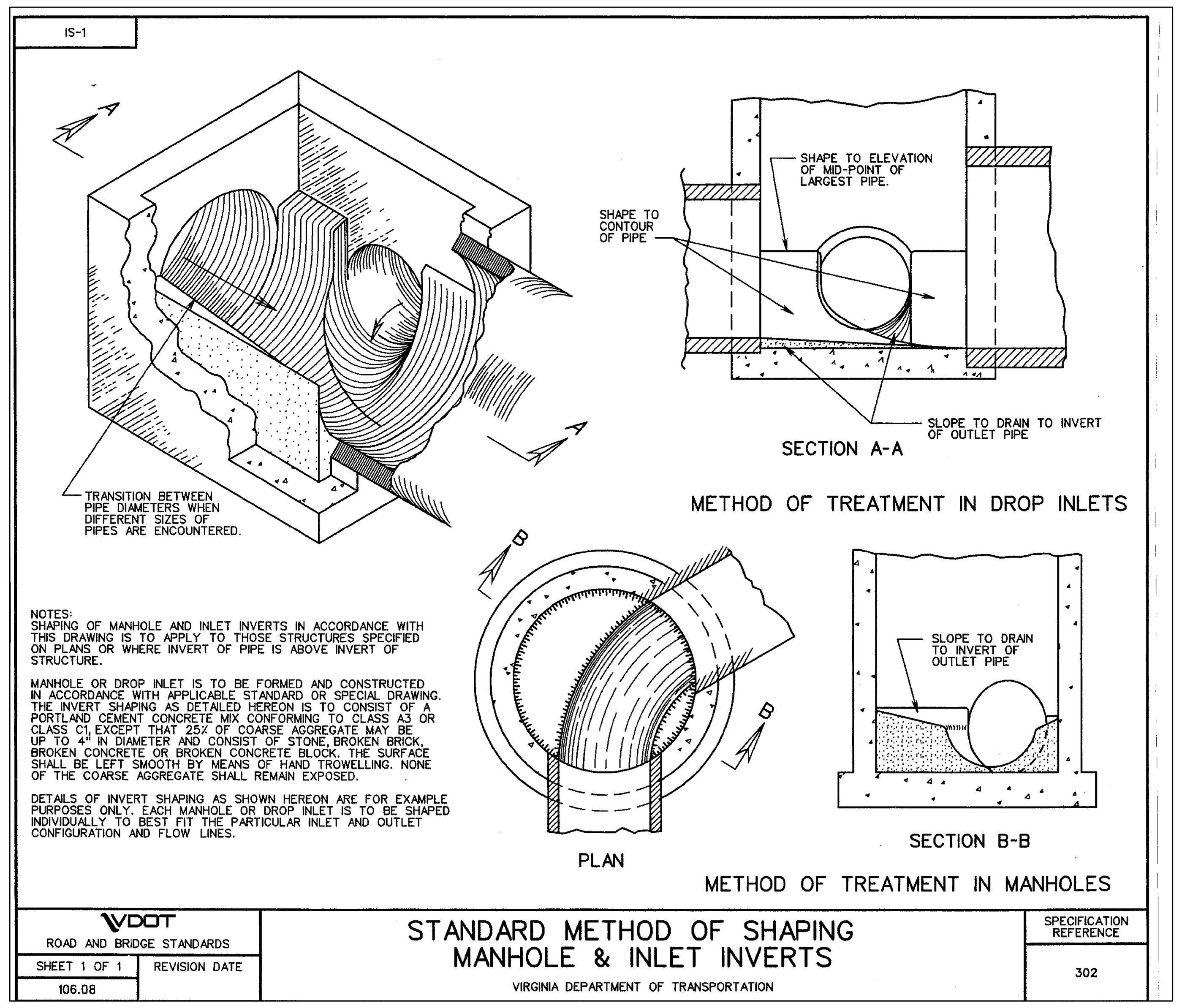
SILTSACK DETAIL

THE SILT SACK PRODUCT SHOWN ON THIS SHEET TO BE USED IN ALL STORM DRAIN INLETS AND IS TO REMAIN PERMANENT FOR DRAINAGE STRUCTURES 12-22

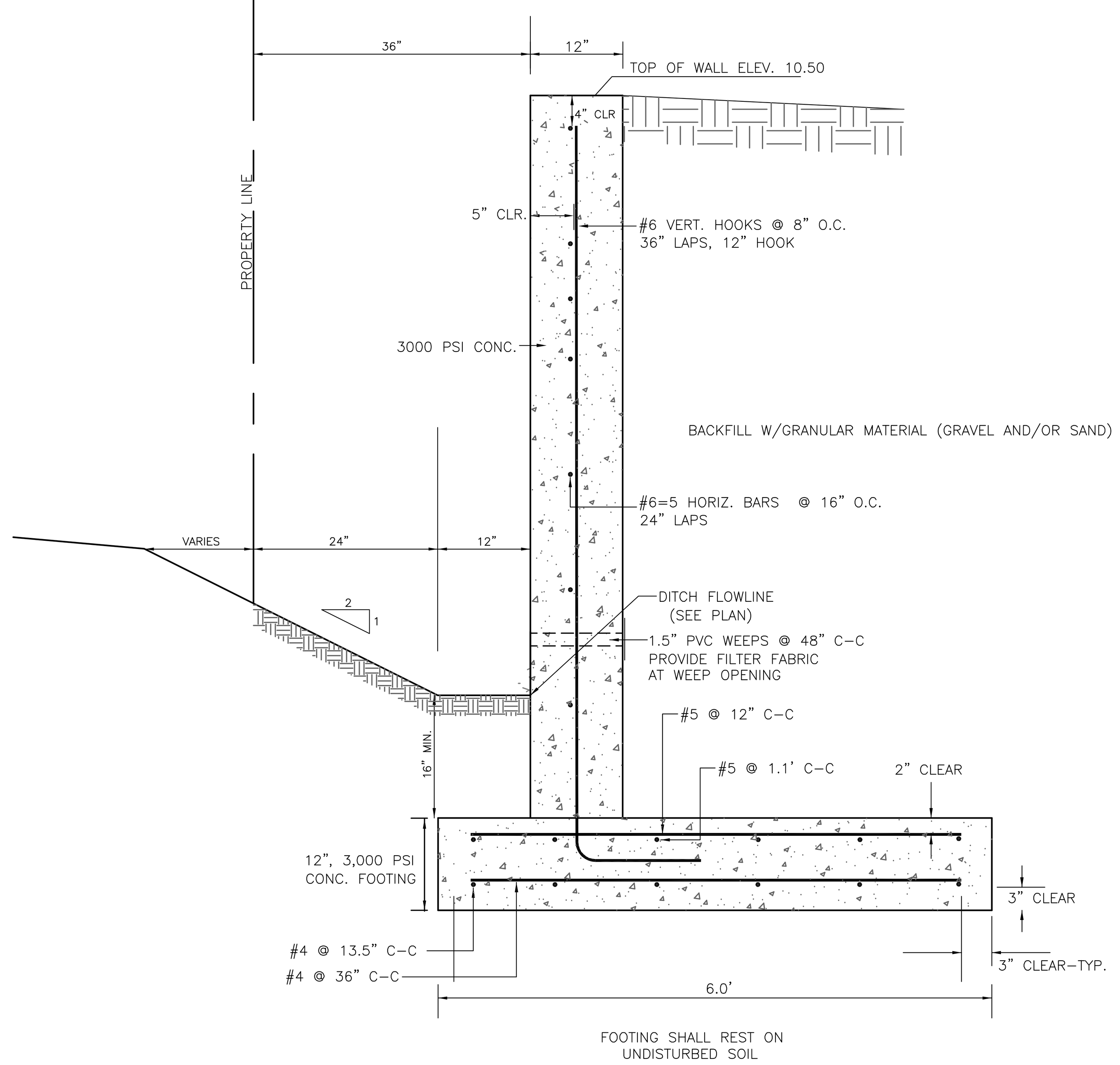


DETAIL

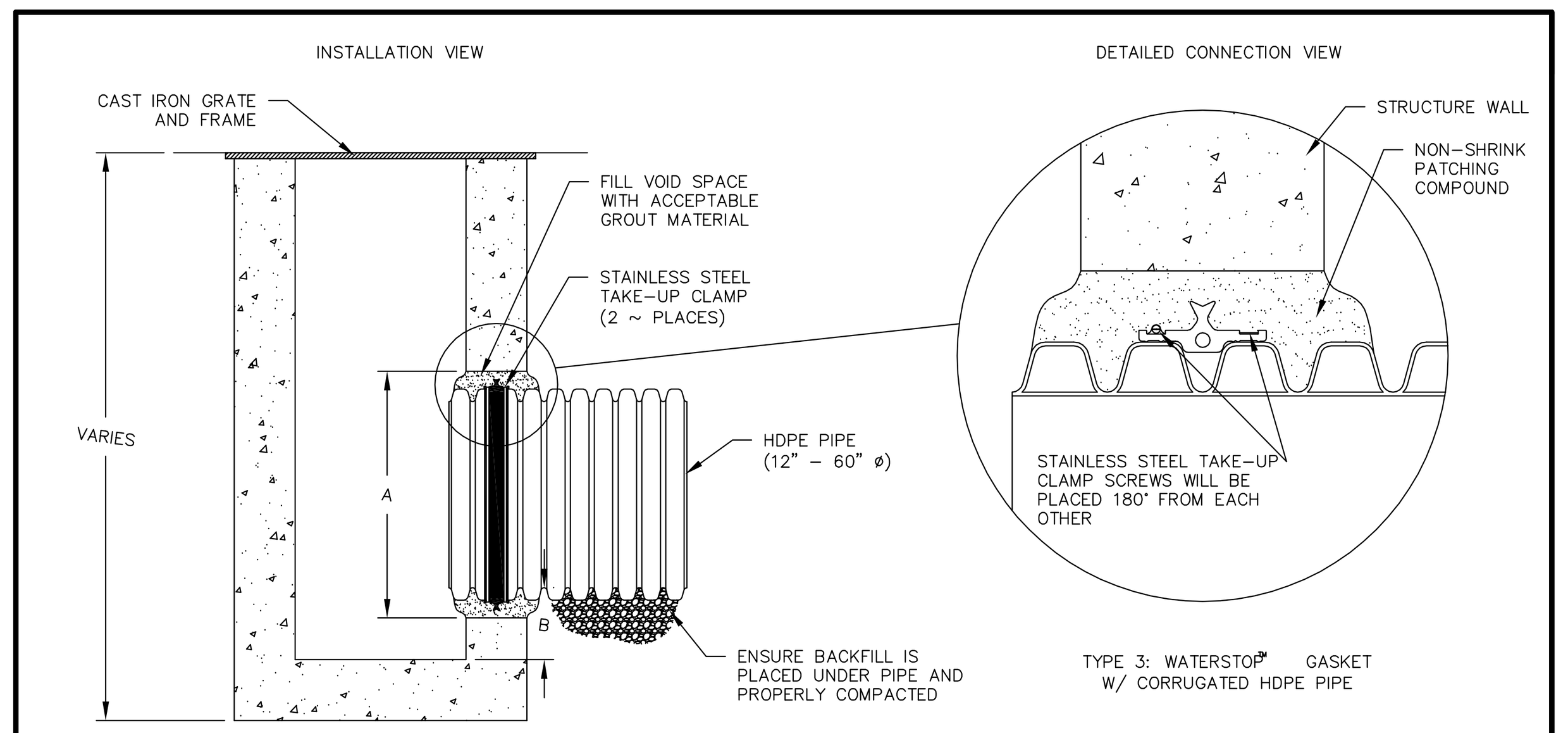
CHECK DAM AT SW CORNER OF BOUNDARY
(NO SCALE)



ALL DRAINAGE STRUCTURES ARE TO RECEIVE INLET SHAPING WITH THE EXCEPTION OF STRUCTURES 12-22.



TYPICAL SECTION ALONG WEST PROPERTY LINE
(NO SCALE)



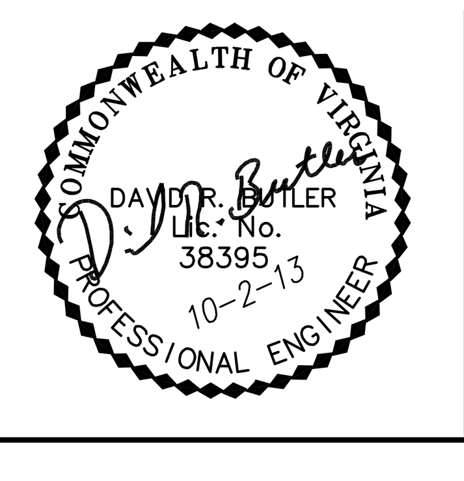
INSTALLATION RECOMMENDATIONS ARE ALSO SPECIFIED IN INSTALLATION GUIDE 1.05: WATERSTOP INSTALLATION

PIPE SIZE (IN)	PIPE OD (IN) A-PROFILE	PIPE OD (IN) H-PROFILE	"A" MIN. HOLE ø (IN)	"B" MIN. DISTANCE PIPE INVERT TO STRUCUTRE INVERT (IN)	MANUFACTURER'S PRODUCT CODE
12	14.5	14.2	19.50	3.7	1202PS
15	17.6	17.8	23.00	4.0	1502PS
18	21.2	21.5	26.50	4.2	1802PS
24	27.8	28.4	33.25	4.5	2402PS
30	35.1	35.5	40.50	5.2	3002PS
36	41.1	41.4	47.00	5.5	3602PS
42	47.7	48.0	53.00	5.7	4202PS
48	53.6	54.0	59.00	5.7	4802PS
60	66.3	67.3	72.00	6.4	6002PS

WATERSTOP STRUCTURE CONNECTION DETAIL
(NO SCALE)

ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OHIO 43026

DRAWN BY: ABC
DATE: DATE
CK'D BY: ENG
SCALE: NTS
SHEET OF



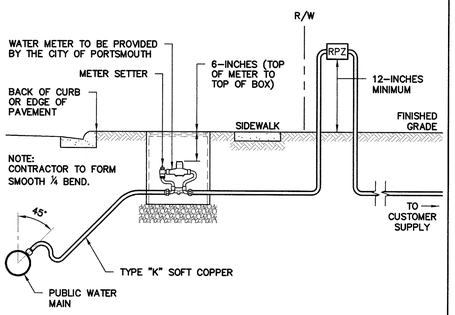
DATE	COMMENT

REVISION SCHEDULE

DETAILS AND NOTES
PORTSMOUTH TERMINAL FACILITY

PROJECT LOCATED IN: VIRGINIA BEACH, VIRGINIA
MADE FOR: PER PROPERTIES
DESIGN BY: DRB | DRAWN BY: JB | CHECKED BY: DRB
DATE: OCTOBER 2, 2013
SCALE: N/A
SHEET 9/13
C7
FILE NO.:

GALLUP
SURVEYORS & ENGINEERS, LTD.
323 FIRST COLONIAL ROAD
VIRGINIA BEACH, VIRGINIA 23454
(757)428-8132 (757)425-2390 FAX



NOTES:

1. THIS IS A MODIFICATION TO THE HRPDC REGIONAL CONSTRUCTION STANDARD DETAILS WD_01, 02, 03, AND 04.
2. METER SERVICE PIPES SHALL BE INSTALLED AT A 90° ANGLE TO THE WATER MAIN WITH THE ONLY EXCEPTION BEING AT A CUL-DE-SAC.
3. SEE SHEET 2 OF 3 FOR LIST OF APPROVED MANUFACTURERS AND MODEL NUMBERS FOR WATER METER APPURTENANCES.
4. STANDARD LOCATION OF WATER METERS: WATER METERS SHALL BE PLACED 12 TO 18 INCHES BEHIND THE BACK OF CURB AND IN FRONT OF THE SIDEWALK. WATER METERS SHALL NOT BE LOCATED WHERE THEY MAY BE EXPOSED TO MOTOR VEHICLES SUCH AS PARKING AREAS, DRIVEWAYS, ALLEYWAYS, OR ROADWAYS.
5. RPZ BACKFLOW PREVENTERS ARE REQUIRED ON ALL COMMERCIAL ACCOUNTS AND SPRINKLER SYSTEMS. THE RPZ IS OWNED AND MAINTAINED BY THE PROPERTY OWNER. FREEZE PROTECTION IS RECOMMENDED.

THE CITY OF PORTSMOUTH — PUBLIC UTILITIES

CONSTRUCTION STANDARDS	Date: 1/16/07	Revised:
SMALL WATER METERS ⅝-INCH TO 2-INCH	Scale: N.T.S.	Sheet No.: 1 of 3
		Detail No.: WD-01

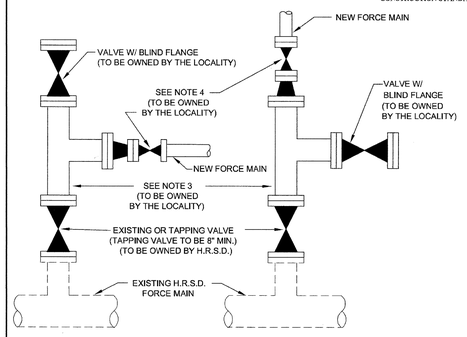
METER APPURTENANCES	METER SIZE (in.)				
	⅝	¾	1	1 ½	2
Corporation Stop Criteria	Corporation Stop shall have nominal sized ball valve, AWWA taper thread inlet, and pack joint for type K copper outlet.				
Corporation Size (in.)	¾		1	1 ½	2
A.Y. McDonald Ford Mueller	4071B-22 FB1000 P-25008		4071B-22 FB1000 P-25008	4701B-22 FB1000 P-25008	4701B-22 FB1000 P-25008
				Tee Head adapter shall be provided.	
Tapping Criteria for Ductile Iron and Cast Iron Pipe	¾ and 1-inch direct tapping.			1 ½ and 2-inch taps shall include a full circle stainless steel clamp. The clamp shall have stainless steel lugs, bolts and nuts, plus a full circle lap gasket.	
Ford Romac Smith-Blair				FS 1 or 2 SS1 264 or 265	FS 1 or 2 SS2 264 or 265
Tapping Criteria for 2-inch HDPE Pipe	¾ and 1-inch taps shall include a gasketed bronze saddle with bronze or stainless steel hardware.			1 ½ and 2-inch taps shall not be made on 2-inch HDPE	
Ford Mueller A.Y. McDonald	S70 S-13000 3891		S70 S-13000 3891		
Copper	Nominal size type K copper				
Meter Setter Criteria	Copper setter shall be horizontal with nominal sized ball valve, inlets and outlets. Setter depth shall be 12-inches. Setter shall fit displacement meter.				
Meter Length (In.)	7.5	9	10.75	13	17
Inlet and Outlet Connections	Setter inlet pack joint and outlet pipe thread. Meter inlet and outlet pipe thread.			Setter inlet pack joint and outlet pipe thread. Meter inlet and outlet shall be AWWA flange.	
A.Y. McDonald Ford Mueller	26-112WX2D33 VB-71-12 HP1578	26-312WX2D33 VB72-44-33 HP1578	26-412WX2D44 VB74-12W4144 HP15751	26-612WNFF-66 VBH76-12-11-66 HP-1422-2	26-712-WNFF-77 VBH77-12-77 HP-1422-00
Meter Box Criteria	PVC Box with PVC Cover 20.6-inches x 11.35-inches			PVC Box with Cast Iron Cover 30-inches x 18-inches	
Southeastern Distributors, Inc.	Cover Box	189-Sensus 190			
Carson Industries				Cover Box	MSBC-1730-R MSBC-1730-18

NOTES:
1. Each 1 ½ or 2-inch meter connection requires full time City inspection.
2. Service pipeline shall be jointless from corporation stop to meter setter.
3. Service pipeline size shall only be changed at the inlet to the meter setter, and the changed size is only allowed with a standard brass reducer.

THE CITY OF PORTSMOUTH — PUBLIC UTILITIES

CONSTRUCTION STANDARDS	Date: 1/16/07	Revised: 2/22/07 4/21/10
SMALL WATER METERS ¾-INCH TO 2-INCH	Scale: N.T.S.	Sheet No.: 2 of 3
		Detail No.: WD-02

HAMPTON ROADS PLANNING DISTRICT COMMISSION
REGIONAL CONSTRUCTION STANDARDS



NOTES:
1. DIRECTION OF TEE BRANCH TO BE DETERMINED BY THE LOCALITY.
2. TEE AND VALVE TO BE FLANGED.
3. TEE TO BE SAME SIZE AS EXISTING VALVE OR TAPPING VALVE.
4. MINIMUM SIZE VALVE TO BE USED IS 4" WITH NON-RISING STEM AND 2" SQUARE OPERATING NUT.

FORCE MAIN CONNECTION TO H.R.S.D. FORCE MAIN

NOT TO SCALE

REFERENCE	CATEGORY	DATE	SHEET No.	DETAIL No.
200,803	SANITARY SYSTEMS	12/10	1 OF 1	SS_18

GENERAL NOTES:

1. All materials and construction methods shall conform to the Hampton Roads Planning District Commission (HRPDC) Regional Standards, fifth edition, as amended by the City of Portsmouth Special Provisions and any other applicable City Ordnance or Code.
2. The Contractor is responsible for locating all public or private utilities, which lie in the construction area prior to any excavation or construction. Any changes to the proposed Utility alignments shall be approved by the Engineer. The Contractor shall be responsible for the repair, at his expense, of all existing utilities damaged during construction
3. The Contractor shall use only approved material in the backfill of utility trenches.
4. All utility trenches shall be backfilled and compacted to within .33' of final subgrade elevation and graded to drain. Excess material shall be removed at the Contractor's expense. All finished slopes in utility easements or in right-of-way not subject to paving shall be topsoiled and seeded in accordance with the current HRPDC and City of Portsmouth specifications and shall not exceed the maximum as follows – cut slope 4:1, fill slope 4:1.
5. The Contractor shall provide temporary drainage to relieve areas that may cause damage to the roadways, and erosion protection during construction as directed by the City of Portsmouth, the HRPDC Regional Standards, and Virginia Erosion and Sediment Control Handbook.
6. All concrete shall be class "A3" air entrained (3,000 psi) unless noted otherwise.
7. All storm sewer pipe shall be as specified on the plan sheets and shall conform to current HRPDC and City of Portsmouth Standards. All pipes shall be reinforced concrete tongue and groove.
8. Prior to construction or excavation, the contractor shall call "Miss Utility" at 1-800-552-7001. In addition, the contractor shall call the offices of any and all public or private utilities and request location of utilities that may exist and cross through the construction area, whether or not said utilities are shown on these plans. Utility companies shall be notified 48 hours in advance of any excavation in the proximity of their utilities. The contractor is responsible for the repair, at his expense, for any damage caused to utilities during construction.
9. All storm sewer pipes, drop inlets and catch basins shall be cleaned of debris and eroding material during the last stage of construction.
10. Gutterbuddy, or approved equal, inlet filter shall be placed around all existing and proposed drainage inlets.
11. Any defective, faulty, cracked, or broken walks, driveways, handicapped ramps or curb and gutter, as determined by the Engineer, shall be removed and replaced to the nearest joint prior to final acceptance at no additional expense to the City. Patching is not acceptable.
12. Any items or instructions, which are noted on the plans but are not included in the Bid Price Schedule shall not be paid for separately, but shall be included in other bid items. Frames and covers for sewer manholes and drainage structures shall be by Capital Foundry, Dewey Brothers, or approved equal.
13. All curb and walks to be removed shall be taken out to the nearest joint. All new walk limits shall be determined in the field and approved by the Engineer.
14. Relocation, removal and/or replacement of all signs shall be coordinated with the Department of Traffic Engineering.
15. All conflicting private utilities, lines and poles will be relocated by others.
16. Contractor shall remove and reset all mailboxes as required (non pay item).
17. All concrete drives shall be 7" thick minimum from roadway to the right-of-way. Concrete drives extending past the right-of-way shall be 4" thick minimum (See Plans for locations).
18. Contractor is responsible for coordinating closure of driveways with individual property owners and must provide access to the houses.
19. Contractor shall protect all trees and shrubs as directed by the Engineer.
20. Removal of existing utilities in same trench as proposed utilities shall not be a pay item.
21. All utility and storm drain lines must be inspected by the Engineering Department prior to backfilling.
22. Disposal of excess material within the City of Portsmouth shall require prior approval from the Engineer. Prior to construction within any existing public right-of-way the contractor shall obtain a permit from the Engineering Department, City of Portsmouth, Virginia. A copy of the approved traffic control plan is to be submitted with the right-of-way permit application.
23. The contractor shall be responsible for replacing with matching materials any pavement, driveways, walks, curbs, etc., that must be cut or that are damaged during construction.
24. When materials which are unsuitable for foundations, subgrades, or other roadway purposes occur within the limits of street construction, the contractor shall be required to excavate such materials below the grade shown on plans and the areas so excavated shall be back filled with approved suitable materials. The extent of undercutting and backfilling to be determined by the Engineering division, City of Portsmouth, Virginia.
25. Replacement of pavement shall be in accordance with standard pavement patching details (STD. Drawing 7.1 or 7.2) Specifications and standards for the Department of Public Works, or in accordance with the right-of-way permit specifications, Engineering Department, City of Portsmouth, Virginia.
26. The contractor shall become completely familiar with the project conditions and proposed work. The information provided on these drawings is for use by the City and the Inspector and is provided by the City to the contractor for informational purposes. The information contained within the Contract Documents and on these drawings shall be used by the contract at their own risk.

SPECIAL NOTES

1. Maximum allowable slopes on driveways shall be 12:1. Driveways shall be placed to nearest joint. Contractor to verify limits of all drives with the Engineer.
2. Preserve all power poles not in conflict. Coordinate relocation of conflicting power poles with the Engineer and company. Cost of utility pole relocations shall be by utility owner.
3. All drives shall be concrete in the R.O.W.
4. There shall be a minimum of six inches between adjacent driveway entrance aprons as measured at the curb.
5. Removal and replacement of gravel drives and tie-ins at the edge of aprons is the responsibility of the contractor. Coordinate limits of work with the Engineer. Drives shall be a minimum of 4" gravel beyond existing R.O.W. (see plans for locations).
6. All water meters and sanitary sewer cleanouts must be set behind the curb within the City right-of-way.
7. Coordinate replacement of outdated meters with the Engineer and the City Public Utilities Department.
8. All fence removal and replacement shall be coordinated by the Engineer and homeowner.
9. The Contractor shall adjust the tie-in length for new walks to accommodate steps as directed by the Engineer.
10. The Contractor shall remove and replace curb and gutter as necessary to complete utility work. Curb and gutter shall be replaced in 10 foot sections. The cost of replacing this curb and gutter will not be measured separate for payment and will be included in the respective utility pay item.
11. All items of work required by the documents to complete the project, but not specifically included in a pay item shall be considered an incidental item in accordance with Specification Section 109.

COMMONWEALTH OF VIRGINIA
DAVID R. BUTLER
LIC. No. 38395
10/2/13
PROFESSIONAL ENGINEER

DATE	COMMENT

REVISION SCHEDULE

UTILITY DETAILS AND NOTES
PORTSMOUTH TERMINAL FACILITY

PROJECT LOCATED IN:			MADE FOR:
VIRGINIA BEACH, VIRGINIA			PER PROPERTIES
DESIGN BY: DRB	DRAWN BY: JB	CHECKED BY: DRB	DATE: OCTOBER 2, 2013

GALLUP
SURVEYORS & ENGINEERS, LTD.
323 FIRST COLONIAL ROAD
VIRGINIA BEACH, VIRGINIA 23454
(757)428-8132 (757)425-2390 FAX

SCALE: N/A
FILE NO.:
SHEET 8/13
C8

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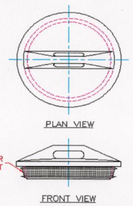
END PLUGS
4" - 60" DIAMETER

PART #	PIPE SIZE
0433AA	4 in (100 mm)
0633AA	6 in (150 mm)
0833AA	8 in (200 mm)
1033AA	10 in (250 mm)
1233AA	12 in (300 mm)
1533AA	15 in (375 mm)
1833AA	18 in (450 mm)
2433AA	24 in (600 mm)
3033AA	30 in (750 mm)
3633AA	36 in (900 mm)
4233AA	42 in (1050 mm)
4833AA	48 in (1200 mm)
6033AA	60 in (1500 mm)



NOTE: ALL FITTINGS DIMENSIONS ARE FOR REFERENCE ONLY

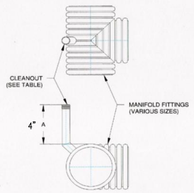
DRAWING #:	2110	
DRAWN BY:	JCB	09.05.06
APPROVED BY:	JCB	06.26.07
REVISIONS:	NJP	06.13.07

THIS DETAIL TO BE USED FOR THE 6" & 12" PLUGS FOR OBSERVATION WELL CAPS

DUAL WALL FABRICATED MANIFOLD CLEANOUT RISER

PART #	PIPE SIZE	A
0402AN	4 in (100 mm)	36.0 in (914 mm)
0602AN	6 in (150 mm)	36.0 in (914 mm)
0802AN	8 in (200 mm)	36.0 in (914 mm)

This component item can only be ordered with standard manifold fittings or standard pipe. When ordering this component item, be sure to include shop drawing showing the location of cleanout riser on standard manifold.



NOTE: ALL FITTINGS DIMENSIONS ARE FOR REFERENCE ONLY

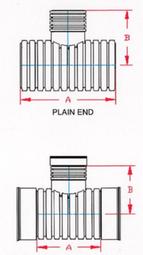
DRAWING #:	4072	
DRAWN BY:	AWM	07.13.06
APPROVED BY:	JCB	06.28.07
REVISIONS:	TJR	10.23.07

THIS DETAIL TO BE USED FOR THE OBSERVATION WELLS

DUAL WALL FABRICATED REDUCING TEES
12"×4" - 12"×10" DIAMETER

PART #	PIPE SIZE	A	B	JOINT
1260AN	12 x 4 in (300 x 100 mm)	21.1 in (536 mm)	13.6 in (345 mm)	*
1260AN85B	12 x 4 in (300 x 100 mm)	13.4 in (341 mm)	12.3 in (312 mm)	ST
1260AN65B	12 x 4 in (300 x 100 mm)	13.4 in (341 mm)	12.3 in (312 mm)	WT
1261AN	12 x 6 in (300 x 150 mm)	23.0 in (585 mm)	14.5 in (368 mm)	*
1261AN85B	12 x 6 in (300 x 150 mm)	15.4 in (390 mm)	12.9 in (328 mm)	ST
1261AN65B	12 x 6 in (300 x 150 mm)	15.4 in (390 mm)	12.9 in (328 mm)	WT
1262AN	12 x 8 in (300 x 200 mm)	25.0 in (634 mm)	17.0 in (432 mm)	*
1262AN85B	12 x 8 in (300 x 200 mm)	17.3 in (439 mm)	15.1 in (383 mm)	ST
1262AN65B	12 x 8 in (300 x 200 mm)	17.3 in (439 mm)	15.1 in (383 mm)	WT
1263AN	12 x 10 in (300 x 250 mm)	26.9 in (683 mm)	16.4 in (416 mm)	*
1263AN85B	12 x 10 in (300 x 250 mm)	19.2 in (488 mm)	13.9 in (352 mm)	ST
1263AN65B	12 x 10 in (300 x 250 mm)	19.2 in (488 mm)	13.9 in (352 mm)	WT

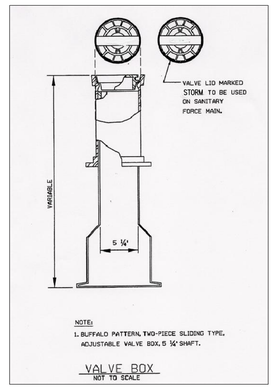
* = PLAIN END
ST = SOIL TIGHT
WT = WATER TIGHT



NOTE: ALL FITTINGS DIMENSIONS ARE FOR REFERENCE ONLY

DRAWING #:	2405	
DRAWN BY:	NJP	08.31.06
APPROVED BY:	JCB	06.30.07
REVISIONS:	NJP	06.14.07

THIS DETAIL TO BE USED FOR THE 6" X 12" TEES



NOTES:
1. BUFFALO PATTERN, TWO-PIECE SLIDING TYPE, ADJUSTABLE VALVE BOX, 5 ¼" SHAFT.

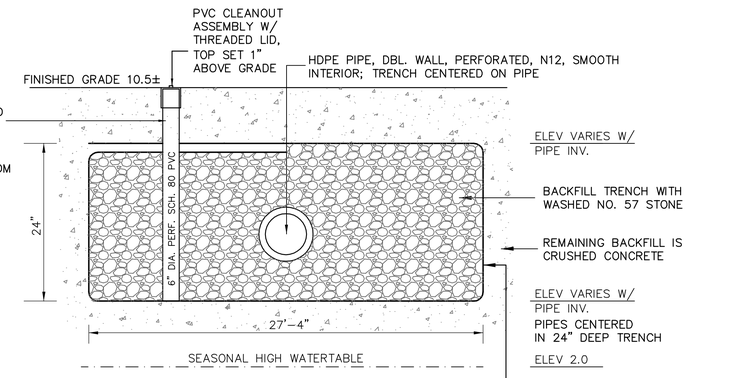
VALVE BOX
NOT TO SCALE

TO BE USED IN CONJUNCTION WITH THE OBERVATION WELLS

BMP MAINTENANCE SCHEDULE

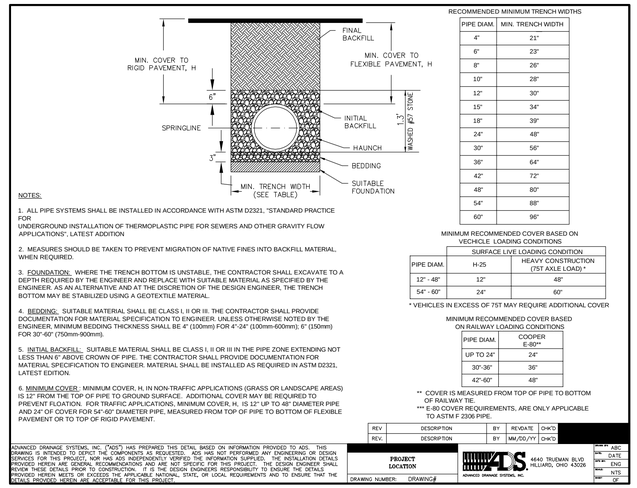
1. INSPECT BMP INFILTRATION SYSTEM MONTHLY AND AFTER MAJOR STORM EVENTS FOR DEBRIS.
2. OBSERVATIONS WELLS SHOULD BE CHECKED EVERY 3 MONTHS FOR CONTAMINATION, WITH MAINTENANCE SCHEDULED AT MINIMUM SIX–MONTH INTERVALS.
3. SHOULD TRENCH FAIL TO DRAIN IN A REASONABLE AMOUNT OF TIME, (48–72 HOURS) OWNER SHALL HAVE PERFORATED PIPES JETTED AND VACUUMED VIA 4" OBSERVATION WELLS AND INLETS.
4. IN THE EVENT OF COMPLETE FAILURE OF THE BMP INFILTRATION FACILITY, I.E., WATER FAILS TO EXFILTRATE WITHIN 72 HOURS AND IS VISIBLE FROM THE OBSERVATION WELLS, THE FILTER FABRIC AND DRAIN SOCKS SHALL BE EXCAVATED, AND REPLACED UTILIZING THE ORIGINAL DESIGN INVERTS AND DIMENSIONS.
5. THE OWNER SHALL KEEP A LOG OF THESE INSPECTIONS ON LOCATION FOR REVIEW BY THE CITY OF PORTSMOUTH, DEPARTMENT OF PUBLIC WORKS.
6. THE TOP 6" OF SURFACE SURROUNDING EACH STORM INLET SHOULD CONSIST OF 57 STONE ONLY, NO CRUSHED CONCRETE, IN ORDER TO PREVENT FINES FROM ENTERING THE INLETS AND CAUSING FAILURE. MINIMUM AREA OF 57 STONE AROUND EACH INLET SHOULD BE 30' DIAMETER OR GREATER.

6" DIAMETER PERFORATED SCH. 80 PVC: PERFORATIONS TO BE 3/8" DIA., SPACED ON STAGGERED ROWS 4" C–C. PROVIDE "DRAIN SOCK" OR EQUAL ON ENTIRE PERFORATED PIPE TO EXTEND FROM FINISHED GRADE SURFACE TO THE BOTTOM OF THE INFILTRATION TRENCH



SEE SHEET 2 FOR PIPE INVERTS, LENGTHS, SLOPES, ETC.

DETAIL
INFILTRATION BEST MANAGEMENT PRACTICE
WITH OBSERVATION WELLS
NO SCALE



NOTES:

1. ALL PIPE SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321, "STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY FLOW APPLICATIONS", LATEST ADDITION
2. MEASURES SHOULD BE TAKEN TO PREVENT MIGRATION OF NATIVE FINES INTO BACKFILL MATERIAL, WHEN REQUIRED.
3. FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH SUITABLE MATERIAL AS SPECIFIED BY THE ENGINEER. AS AN ALTERNATIVE AND AT THE DISCRETION OF THE DESIGN ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING A GEOTEXTILE MATERIAL.
4. BEDDING: SUITABLE MATERIAL SHALL BE CLASS I, II OR III. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. UNLESS OTHERWISE NOTED BY THE ENGINEER, MINIMUM BEDDING THICKNESS SHALL BE 4" (100mm) FOR 4"-24" (100mm-600mm); 6" (150mm) FOR 30"-60" (760mm-900mm).
5. INITIAL BACKFILL: SUITABLE MATERIAL SHALL BE CLASS I, II OR III IN THE PIPE ZONE EXTENDING NOT LESS THAN 6" ABOVE CROWN OF PIPE. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. MATERIAL SHALL BE INSTALLED AS REQUIRED IN ASTM D2321, LATEST EDITION.
6. MINIMUM COVER: MINIMUM COVER, H, IN NON-TRAFFIC APPLICATIONS (GRASS OR LANDSCAPE AREAS) IS 12" FROM THE TOP OF PIPE TO GROUND SURFACE. ADDITIONAL COVER MAY BE REQUIRED TO PREVENT FLOATION. FOR TRAFFIC APPLICATIONS, MINIMUM COVER, H, IS 12" UP TO 48" DIAMETER PIPE AND 24" OF COVER FOR 54"-60" DIAMETER PIPE, MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TO TOP OF RIGID PAVEMENT.

RECOMMENDED MINIMUM TRENCH WIDTHS

PIPE DIAM.	MIN. TRENCH WIDTH
4"	21"
6"	23"
8"	26"
10"	28"
12"	30"
15"	34"
18"	39"
24"	48"
30"	56"
36"	64"
42"	72"
48"	80"
54"	88"
60"	96"

MINIMUM RECOMMENDED COVER BASED ON VEICHICLE LOADING CONDITIONS

	SURFACE LIVE LOADING CONDITION	
PIPE DIAM.	H-25	HEAVY CONSTRUCTION (75T AXLE LOAD) *
12" - 48"	12"	48"
54" - 60"	24"	60"

* VEHICLES IN EXCESS OF 75T MAY REQUIRE ADDITIONAL COVER

MINIMUM RECOMMENDED COVER BASED ON RAILWAY LOADING CONDITIONS

PIPE DIAM.	COOPER E-80**
UP TO 24"	24"
30"-36"	36"
42"-60"	48"

** COVER IS MEASURED FROM TOP OF PIPE TO BOTTOM OF RAILWAY TIE.
*** E-80 COVER REQUIREMENTS, ARE ONLY APPLICABLE TO ASTM F 2306 PIPE.

REV.	DESCRIPTION	BY	REVDATE	CHK'D
REV.	DESCRIPTION	BY	MM/DD/YY	CHK'D

ADVANCED DRAINAGE SYSTEMS, INC. ("ADS") HAS PREPARED THIS DETAIL BASED ON INFORMATION PROVIDED TO ADS. THIS DRAWING IS INTENDED TO DEPICT THE COMPONENTS AS REQUESTED. ADS HAS NOT PERFORMED ANY ENGINEERING OR DESIGN SERVICES FOR THIS PROJECT, NOR HAS ADS INDEPENDENTLY VERIFIED THE INFORMATION SUPPLIED. THE INSTALLATION DETAILS PROVIDED HEREIN ARE GENERAL RECOMMENDATIONS AND ARE NOT SPECIFIC FOR THIS PROJECT. THE DESIGN ENGINEER SHALL DETERMINE IF THE PRODUCT, CONFIGURATION, AND INSTALLATION DETAILS ARE APPROPRIATE FOR THIS PROJECT. IF THE DETAILS PROVIDED HEREIN MEETS OR EXCEEDS THE APPLICABLE NATIONAL, STATE, OR LOCAL REQUIREMENTS AND TO ENSURE THAT THE DETAILS PROVIDED HEREIN ARE ACCEPTABLE FOR THIS PROJECT.

PROJECT LOCATION

DRAWING NUMBER: DRAWING#

ADS ADVANCED DRAINAGE SYSTEMS, INC. 4640 TRUEMAN BLVD. HILLIARD, OHIO 43026

DRAWN BY:	ABC
DATE:	DATE
SHEET:	ENG
SCALE:	NTS
PAGE:	OF

ADS PERFORATED N12 HDPE PIPE BEDDING DETAIL
(EXCLUSIVE OF STRUCTURES 12–22)

HDPE PIPE SHALL BE DUEL WALL, SMOOTH INTERIOR, N–12
BY ADVANCED DRAINAGE SYSTEMS, INC., OR APPROVED EQUAL

COMMONWEALTH OF VIRGINIA
DAVID R. BUTLER
Lic. No. 38395
10-2-13
PROFESSIONAL ENGINEER

DATE	COMMENT
9/19/12	REVISE PROJECT NAME
7/12/12	DSC REVIEW
4/25/12	DSC REVIEW

REVISION SCHEDULE

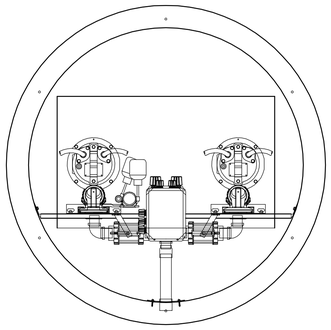
BMP NOTES & DETAILS

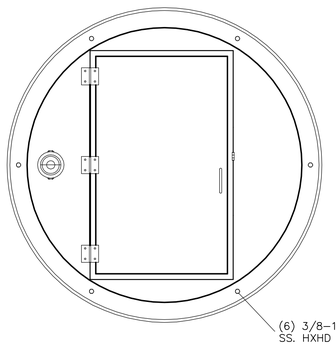
PORTSMOUTH TERMINAL FACILITY

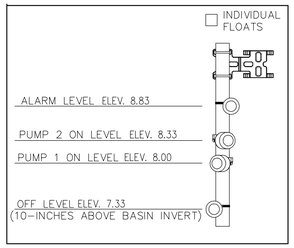
PROJECT LOCATED IN: VIRGINIA BEACH, VIRGINIA		MADE FOR: PER PROPERTIES
DESIGN BY: DRB	DRAWN BY: JB	CHECKED BY: DRB
		DATE: OCTOBER 2, 2013

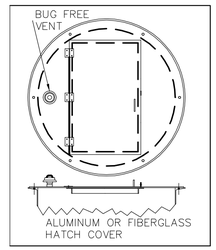
GALLUP
SURVEYORS & ENGINEERS, LTD.
323 FIRST COLONIAL ROAD
VIRGINIA BEACH, VIRGINIA 23454
(757)428–8132 (757)425–2390 FAX

SCALE: 1" = 10'
FILE NO.:
SHEET 9/13
C9

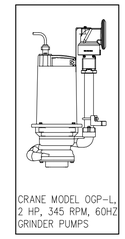








PUMP OPTION:



Pump Station Notes:

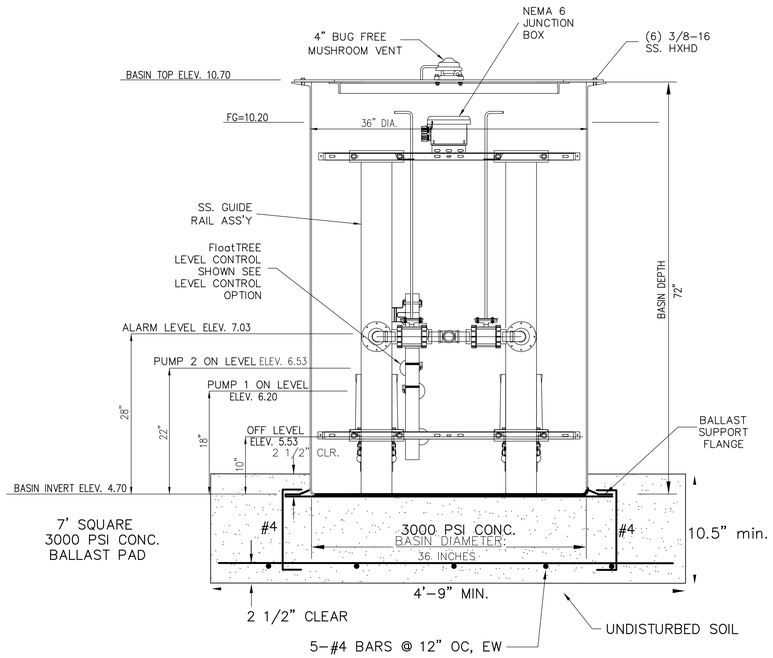
1. Furnish and install a submersible duplex grinder pump station in accordance with the specifications. The pump shall be equipped with a 2 HP submersible electric motor. The pump shall be capable of delivering 30 GPM at 31 feet of head. Pump shall be a Crane Series OGP-L, 2 HP Grinder Pump, Single Phase, 240 V, or equal. Low voltage protection shall be provided for the motor. Installer to verify available power before ordering pumps. Impeller size: 4-inch
2. Exfiltration: All force mains shall be tested at a minimum pressure of at least 50% above the design operation pressure. Leakage shall not exceed the amount driven by the following formula: L = ND 1/2 3700 Where L is allowable Leakage in gallons per hour N is the number of pipe joints D is the Pipe Diameter in inches P is the Test Pressure in PSI The contractor shall test the pump station and force main for a minimum of 30 minutes.
3. Audio and visual alarm system must be provided with and alarm test function. The alarm shall be on an independent circuit. The alarm system at the station shall be equipped with an alarm test function. Alarm shall monitor high water and power failure.
4. NEMA 1 control panel to be located on the exterior wall and mounted in accordance with the NEC.
5. Electrical service outlet receptacle shall be available in the vicinity of the pump station.
6. A backflow prevention device will be provided on any faucet within 50 feet of the pump station.
7. Provide minimum of 185 gal. of storage between alarm level and overflow elevation (top of station) within the pump well.
8. A back-up power ssupply for the alarm system shall be provided with a minimum capacity of 24 hours.
9. A weatherproof sign, containing notification proceedures in the event of pump failure, shall be placed adjacent to the audio / visual alarm.

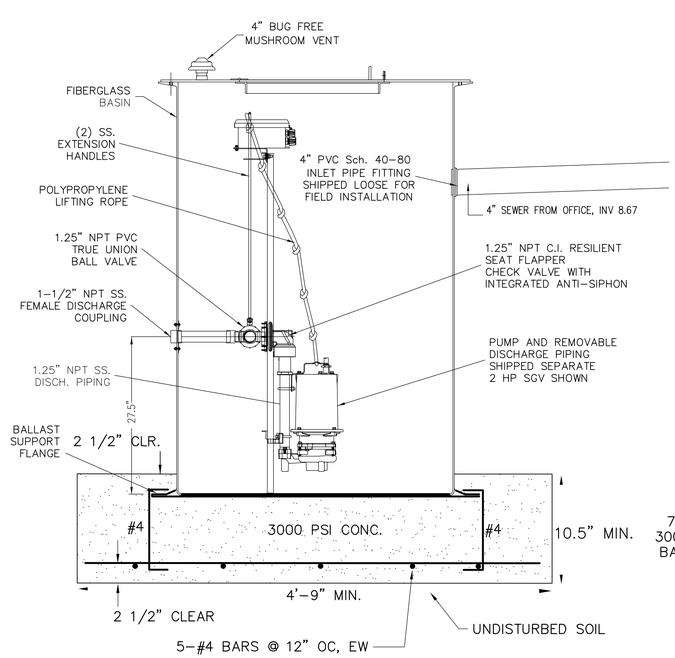
NOTES :

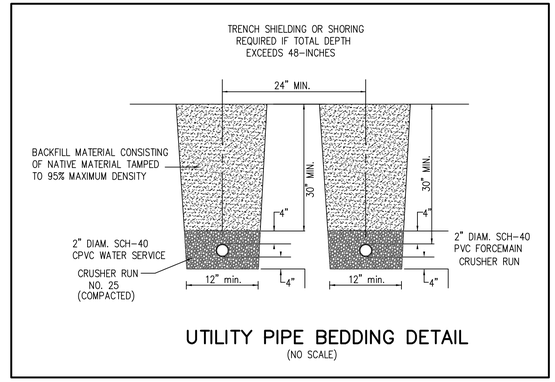
1) ALL DIMENSIONS TO BE ± 1/4" UNLESS OTHERWISE SPECIFIED.

2) CONTACT STUART TAYLOR, TENCARVA MACHINERY CO. TO COORDINATE SALES AND DELIVERY OF EQUIPMENT

933 CORPORATION LANE
CHESAPEAKE, VA. 23320
757-548-0400
EMAIL: STAYLOR@TENCARVA.COM







UTILITY PIPE BEDDING DETAIL
(NO SCALE)

PACKAGE PUMP STATION DETAILS

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REV A

CRANE PUMPS & SYSTEMS

BARNES PRESSURE SYSTEMS

COMMONWEALTH OF VIRGINIA
DAVID R. BUTLER
Lic. No.
38395
10/2/13
PROFESSIONAL ENGINEER

DATE	COMMENT

REVISION SCHEDULE

PUMP STATION DETAILS

PORTSMOUTH TERMINAL FACILITY

PROJECT LOCATED IN: VIRGINIA BEACH, VIRGINIA
MADE FOR: PER PROPERTIES
DESIGN BY: BWG | DRAWN BY: JB | CHECKED BY: BWG
DATE: OCTOBER 2, 2013
SCALE: NO SCALE
SHEET: 10/13
FILE NO.:
C10

GALLUP
SURVEYORS & ENGINEERS, LTD.
323 FIRST COLONIAL ROAD
VIRGINIA BEACH, VIRGINIA 23454
(757)428-8132 (757)425-2390 FAX

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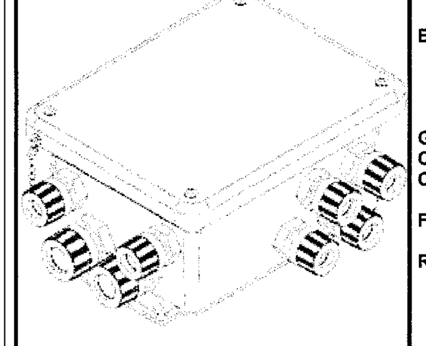
Junction Box
NEMA 6, Duplex

BARNES PRESSURE SYSTEMS
www.cranepumps.com

Accessories PS-063



Junction Box
NEMA 6, Duplex

Specifications:

The Duplex Junction Box and all connections have a NEMA 6 Rating to protect against occasional submersion and is used in conjunction with U.L. listed water-tight connectors suitable for use with U.L. listed Direct Burial Cable.

BOX & COVER .... Constructed of Impact-Resistant, Nonconductive, Fiberglass Reinforced Polyester with Stainless Steel Screws
GASKET .... Neoprene
CHAIN .... Stainless Steel
CORD GRIPS .... Non-Metallic, Valox with Neoprene type Grommet.
FLOAT SWITCH .... Mercury, Narrow Angle, Horizontal
RECOGNITION : .... UL Listed 508

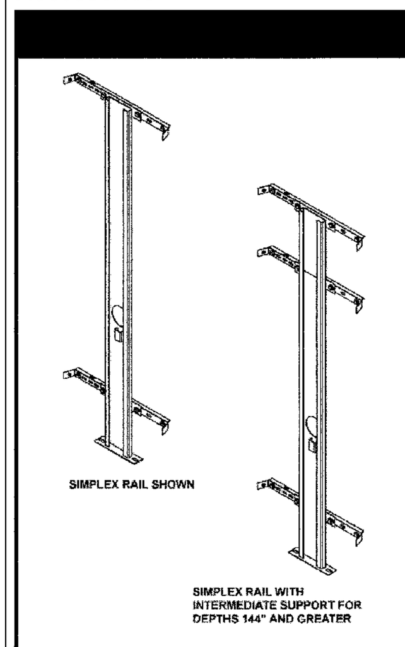
Submersible Wastewater Pump Association SWPA MEMBER File No. E151564

SECTION F PAGE 28 DATE 11/03
CRANE PUMPS & SYSTEMS — A Crane Co. Company
USA: (937) 778-8947 • Canada: (905) 457-6223 • International: (937) 615-3598

"C" Channel Guide Rails
For 1¼" NPT Moveable Fittings

BARNES PRESSURE SYSTEMS
www.cranepumps.com

Accessories PS-051



"C" Channel Guide Rails for
1¼" NPT Discharge
Simplex or Duplex

Specifications:

The "C" channel guide rail assembly is made of 300 series stainless steel. The guide rail mounts to the upper and lower horizontal brackets attached to the basin wall. The rail also rest on the bottom of the basin floor. The stainless steel guide rail supports the pump the required distance from the basin floor. Guide brackets (supplied with the Moveable Fitting Assembly) are attached to the pump for positioning of the unit on the guide rail during installationand removal.

The stationary of the hydraulically sealed discharge is powder coated machined cast iron. The stationary fitting has a fiber rein-forced neoprene diaphragm clamped between the stainless steel rail and the stationary pressure vessel. The moveable fitting is held against the stationary fitting by the construction of the stainless steel rail, aligning the movable fitting to the flexible diaphragm for proper sealing of the two surfaces.

Each assembly includes:
- 300 Series Stainless Steel Guide Rail.
- 300 Series Stainless Steel Upper And Lower Support Brackets.
- Available For Basin Depths 48" to 156" (1.2M to 3.9m)
- 300 Series Stainless Steel Intermediate support Brackets for Basin Depths 144" (3.7m) and Greater.
- Powder Coated Cast Iron Stationary Fitting.
- Fiber Reinforced Neoprene Diaphragm.

Quantity of One (1) each for Simplex and Two (2) for Duplex.

SWPA MEMBER

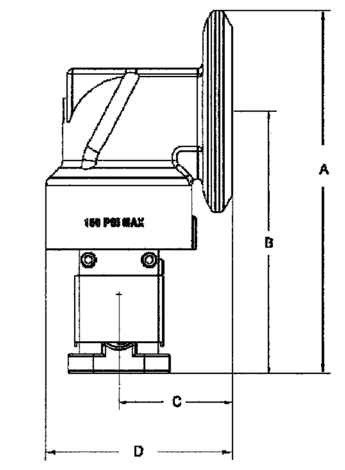
SECTION F PAGE 8 DATE 11/03
CRANE PUMPS & SYSTEMS — A Crane Co. Company
USA: (937) 778-8947 • Canada: (905) 457-6223 • International: (937) 615-3598

Flap Style Check Valve/Upper Moveable
For use with "C" Channel Rails
1¼" NPT

BARNES PRESSURE SYSTEMS
www.cranepumps.com

Accessories PS-090

inches (mm)



SIZE NPT	PART NO	A	B	C	D	WEIGHT LBS
1¼" NPT	112354	9.23 (234)	6.39 (162)	2.89 (73)	4.74 (120)	13.0 (5.9kg)

SECTION F PAGE 10 DATE 11/03
CRANE PUMPS & SYSTEMS — A Crane Co. Company
USA: (937) 778-8947 • Canada: (905) 457-6223 • International: (937) 615-3598

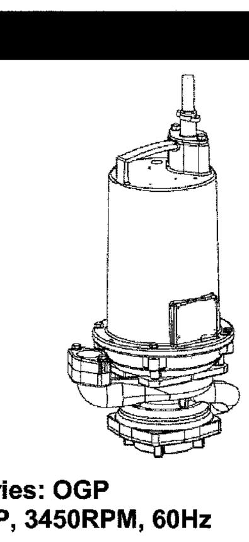
Model OGP-L
Recessed Vortex

BARNES PRESSURE SYSTEMS
www.cranepumps.com

PS-091 *Submersible Grinder Pumps*

Specifications:

DISCHARGE .... 1¼" NPT, Vertical, Bolt-on Flange
LIQUID TEMPERATURE .... 104°F (40°C) Continuous
VOLUTE .... Cast Iron ASTM A-48, Class 30
MOTOR HOUSING .... Cast Iron ASTM A-48, Class 30
SEAL PLATE .... Cast Iron ASTM A-48, Class 30
IMPELLERS:
Design .... 12 Vane,Vortex, With Pump Out Vanes On Back Side. Dynamically Balanced, ISO G6.3.
Material .... 85-5-5-5 Bronze
IMPELLER SPACER .... 300 Series Stainless Steel
SHREDDING RING .... Hardened 440C Stainless Steel Rockwell® C-55.
CUTTER .... Hardened 440CStainless Steel, Rockwell® C-55.
SHAFT .... 416 Stainless Steel
SQUARE RINGS .... Buna-N
HARDWARE .... 300 Series Stainless Steel
PAINT .... Air Dry Enamel.
SEAL:
Design .... Single Mechanical
Material .... Rotating Faces - Silicon-Carbide; Stationary Faces - Silicon-Carbide; Elastomer - Buna-N; Hardware -300 Series Stainless
CORD ENTRY .... 30 ft. (9.1m) Std. Cord. Custom Molded Quick Connect, for Sealing and Strain Relief
CORD
Manual .... CSA/UL Approved 12/3 Type SOW
UPPER BEARING:
Design .... Single Row, Angular contact Ball
Lubrication .... Oil
Load .... Radial & Thrust
LOWER BEARING:
Design .... Single Row, Angular contact Ball
Lubrication .... Oil
Load .... Radial & Thrust
MOTOR:
Design .... NEMA L-Single Phase Torque Curve, Oil-Filled, Squirrel Cage Induction
Insulation .... Class F
SINGLE PHASE .... Capacitor Start/Capacitor Run.



Series: OGP
2HP, 3450RPM, 60Hz

SWPA MEMBER — omni GRIND plus GRINDER PUMPS

CSA 108 - File No. LR16567
UL 778

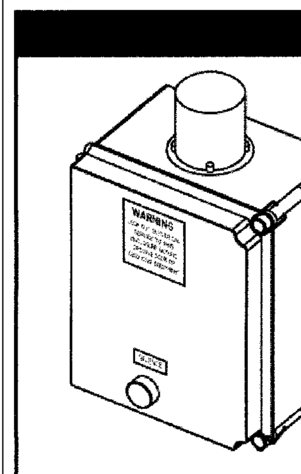
DESCRIPTION:
THE GRINDER PUMP IS DESIGNED TO REDUCE DOMESTIC SEWAGE TO A FINELY GROUND SLURRY.

CRANE PUMPS & SYSTEMS — A Crane Co. Company
USA: (937) 778-8947 • Canada: (905) 457-6223 • International: (937) 615-3598
SECTION A PAGE 1 DATE 3/07

Stealth Control Panels
Duplex
Wall Mounted Series

BARNES PRESSURE SYSTEMS
www.cranepumps.com

Control Panels PS-040



Wall Mounted Series:
Stealth-O-200

STEALTH™ CONTROL PANELS

Specifications:

R & O Series
Listed by Underwriters Laboratories, duplex pump control panels provide reliable grinder pump station operation and potential malfunction warning.

STANDARD FEATURES:
- UL 508A Listed
- NEMA 4X Fiberglass Enclosure
- Padlockable Latch
- Pump/Panel Circuit Breaker
- IEC Rated Motor Contactor
- Pump Start Pushbutton
- Individually Fused Circuits for Alarm and Control Components
- 25 Watt High Water Alarm Light with NEMA 4X Lens
- Terminal Strip and Ground Lug for Incoming Connections
- Pump Alternator (200 Series Duplex Panels Only)
- 90 db alarm horn with NEMA 4X silence pushbutton.

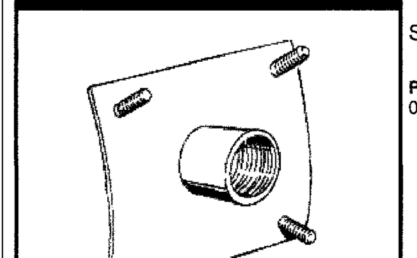
File No. LR142177 SWPA MEMBER

SECTION C PAGE 2 DATE 10/06
CRANE PUMPS & SYSTEMS — A Crane Co. Company
USA: (937) 778-8947 • Canada: (905) 457-6223 • International: (937) 615-3598

Discharge Couplings

BARNES PRESSURE SYSTEMS
www.cranepumps.com

Accessories PS-048



Discharge Couplings

Specifications:

Stainless Steel Bolt-On Couplings

P/N	Description
094801	1½" NPT, Female

SWPA MEMBER

SECTION F PAGE 4 DATE 11/03
CRANE PUMPS & SYSTEMS — A Crane Co. Company
USA: (937) 778-8947 • Canada: (905) 457-6223 • International: (937) 615-3598

Fiberglass Basins
With Ballast Support Flange

BARNES PRESSURE SYSTEMS
www.cranepumps.com

PS-045 *Accessories*

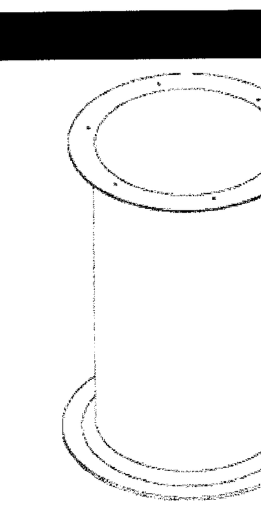
Specifications:

Basin construction is custom molded fiberglass reinforced polyester resin.

The wall thickness shall be sufficient to withstand a water-saturated sand load of 120 lbs per cubic foot (1.9 gms/cu. cm) with a 1.5 safety factor.

The Ballast support flange shall extend a minimum of three inches (76mm) on the radius of the basin. The flange is fiberglassed to the bottom of the basin. When secured properly to a concrete pad or pouring concrete over and around the flange, prevents the basin from rising, or floating out of the ground when empty as a result of static ground pressure.

The basin will withstand a maximum temperature of 150°F (66°C).



SWPA MEMBER

CRANE PUMPS & SYSTEMS — A Crane Co. Company
USA: (937) 778-8947 • Canada: (905) 457-6223 • International: (937) 615-3598
SECTION F PAGE 1 DATE 11/03

Duplex
*Ultra*GRIND™ Jobsite Wired Basin Package
Stainless Rail with Junction Box

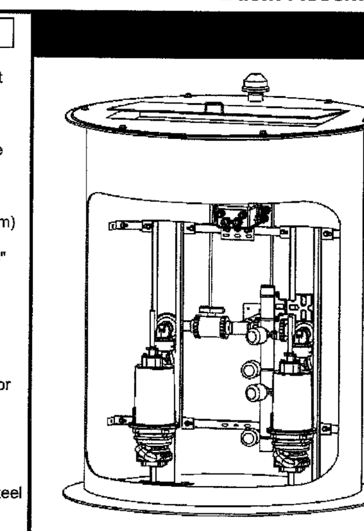
BARNES PRESSURE SYSTEMS
www.cranepumps.com

PS-029 *Basin Assemblies*

Specifications:

inches (mm)

BASIN .... Fiberglass w/ 3" (76) Ballast Support Flange
DISCHARGE .... Stainless Steel.
Size .... 1¼" or 2" NPT, Female
INLET .... 4" (102) sch. 40 Flexible Inlet Flange (For Field Installation)
COVER
Fiberglass .... One piece,Grass Green with 2" (51) Bug-Free Vent. 36" (.9m) & 42" (1.1m) Dia. Basins Only
RAIL SYSTEM .... Qty. 2, 300 Series Stainless Steel "C" Channel
STATIONARY DISCHARGE FITTING: (Quantity of Two)
Stationary .... Powder Coated Cast Iron
Diaphragm .... Fiber Reinforced Neoprene
JUNCTION BOX .... NEMA 6 with cord grips for incoming cables
ELECTRICAL .... Cord grips for Direct Burial Cable (For Field Installed)
BALL VALVE: (Quantity of Two)
Design .... Full Port True Union
Material .... PVC
Size .... 1¼" or 2" NPT
EXTENSION HANDLE .... Qty. Two, 3/8" Dia. (9.5) Stainless Steel
LIFTING DEVICE .... Qty. Two 1/2" Dia. knotted polypropylene rope with a breaking strength of 3,750 lbs.
HARDWARE .... 300 Series Stainless Steel
DISCHARGE PIPING .... 300 Series Stainless Steel
LEVEL CONTROLS:
Floats .... Quantity of four Separate Mercury Level Controls, Polypropylene Housings with 18-2, SJOW cord, mounted on PVC pipe
MOVABLE SUB-ASSEMBLY .... (Two Required, Ordered with Pump)
FLAPPER/ANTI-SIPHON CHECK VALVE:
Housing .... Cast Iron, powder coated with integrated anti-siphon
Flapper .... Fiber reinforce Nitrile
PUMP BRACKETS .... 300 Series Stainless Steel
DISCHARGE PIPING .... Stainless Steel



Series: DSRS and LDSRS
1½" NPT Discharge or
2½" NPT Discharge

For use with OGP, OGVF, OGVH, SGV or SGPC pumps

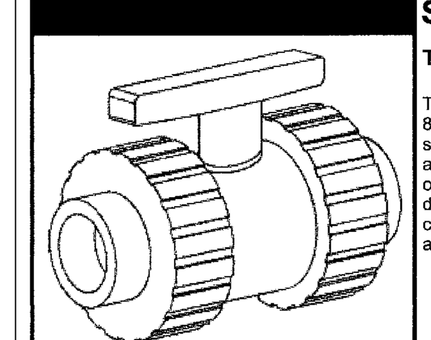
SWPA MEMBER File No. LR151564

CRANE PUMPS & SYSTEMS — A Crane Co. Company
USA: (937) 778-8947 • Canada: (905) 457-6223 • International: (937) 615-3598
SECTION B PAGE 9 DATE 11/03

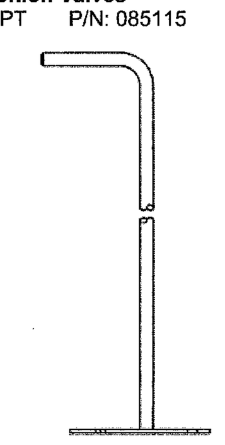
True Union Ball Valves
1¼" NPT

BARNES PRESSURE SYSTEMS
www.cranepumps.com

Accessories PS-068



True Union Valves
1¼" NPT P/N: 085115



Extension Handles

Specifications:

True Union Ball Valves:

The True Union Ball Valves are manufactured of Type I Schedule 80 PVC, (Cell Classification 12454-B) with EPDM O-rings for superior chemical and corrosion resistance. These valves are rated at 150 PSI, (10.6 kgs/sq. cm) non-shock, with a maximum operating pressure at 73°F (23°C). The valves are of quick disconnect design for maintenance and can be repairable to the component level, also full port bore, 1/4 turn, leak tight shut-off and are listed by NSF for use in portable water service.

Extension Handle:

Made From 3/8" (10mm) diameter 300 series stainless steel and can be used with 1¼" NPT true union ball valves.

SWPA MEMBER

SECTION F PAGE 14 DATE 11/03
CRANE PUMPS & SYSTEMS — A Crane Co. Company
USA: (937) 778-8947 • Canada: (905) 457-6223 • International: (937) 615-3598

Flap Style Check Valve/Upper Moveable
For use with "C" Channel Rails
1¼" NPT

BARNES PRESSURE SYSTEMS
www.cranepumps.com

PS-089 *Accessories*

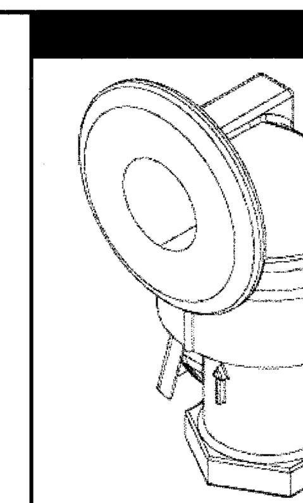
Specifications:

HOUSING .... ASTM Class 30 Cast Iron, Powder Coated
FLAPPER .... Nitrile, Nylon Reinforced
TEMPERATURE .... 160°F (71°C) continuous
PRESSURE RATING .... 150 Lbs./Sq. In.(10.6 kgs/sq. cm)

FEATURES:
- Works in BARNES standard "C" Channel Rail
- Full port check with minimum head loss
- 18" static head requirement for minimum seat
- Valve includes integrated anti-siphon
- 300 series stainless steel hardware
- Integrated upper moveable fitting
- Resilient seat flapper
- Quiet operation
- No maintenance
- Vertical position mounting

APPLICATIONS:

Waste water or residential sewage, liquid manure, etc.



Cast Iron Flap Style Check Valve/Upper Moveable Fitting
1¼" NPT P/N: 112354

SWPA MEMBER

CRANE PUMPS & SYSTEMS — A Crane Co. Company
USA: (937) 778-8947 • Canada: (905) 457-6223 • International: (937) 615-3598
SECTION F PAGE 9 DATE 11/03

Basin Covers
Fiberglass
For 24" (619) Dia. thru 42" (1067) Dia. Basins

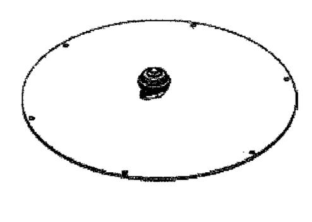
BARNES PRESSURE SYSTEMS
www.cranepumps.com

PS-054 *Accessories*

Specifications:

The Fiberglass Covers are of reinforced plastic and are grass green in color. Cover available for basin diameters 24" (610mm) and 30" (762mm) and are .37" (9.5mm) thick, and for 36" (914mm) and 42" (1067mm) diameters that are .50" (13mm) thick.

Covers have a service rating of 150 lbs/sq. ft. (732kgs/sq. meter) minimum.



Basin Covers
Fiberglass
For 24" (610mm) Dia. thru 42" (1067mm) Dia. Basins

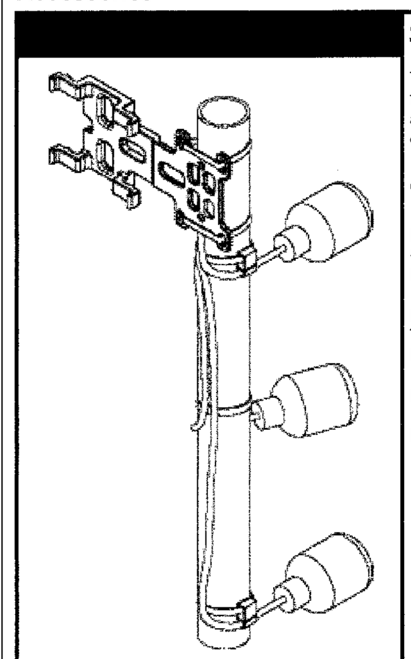
SWPA MEMBER

CRANE PUMPS & SYSTEMS — A Crane Co. Company
USA: (937) 778-8947 • Canada: (905) 457-6223 • International: (937) 615-3598
SECTION F PAGE 17 DATE 11/03

Level Controls
Individual Floats Assembly, ™ Duplex
for Barnes "C" Channel Rail System

BARNES PRESSURE SYSTEMS
www.cranepumps.com

Accessories



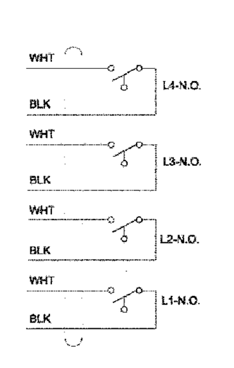
Individual Floats Assembly
The universal mounting bracket allows the Indi-vidual Floats to be located on either side of the"C" channel rail for ease of installation around existing inlets or other obstructions.

Specifications:

The Mercury Level Controls are pilot duty devices which control the function of motor load devices, such as contactors, motor starters, and power relays, to automatically cycle a pump or pumps. They can also be used for alarm signaling devices.

Qty. 4 floats for Duplex, Pump Off, Pump 1 On, Pump 2 On, Alarm.

Floats Assembly:
CORD .... 18/2 SJOW, .29 (7.4mm) Dia
MOUNTING .... Clip, ABS/Nylon and 300 series Bandclamp
FLOAT HOUSING .... Polypropylene
TEMPERATURE RATING .... 60° C
FLOAT SWITCH .... Mercury, Narrow Angle, Horizontal
FLOAT SWITCH RATING: .... 4.5A @ 115VAC RES; 2.25A @ 230VAC RES
POLE .... PVC



DUPLEX WIRING DIAGRAM
DRY CONDITION

SWPA MEMBER

SECTION F PAGE 26 DATE 11/03
CRANE PUMPS & SYSTEMS — A Crane Co. Company
USA: (937) 778-8947 • Canada: (905) 457-6223 • International: (937) 615-3598

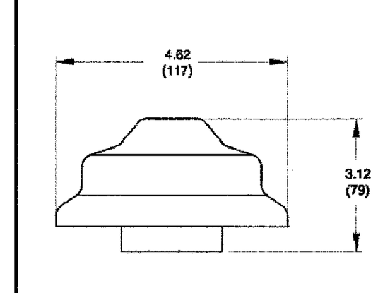
Bug-Free Vent

BARNES PRESSURE SYSTEMS
www.cranepumps.com

PS-056 *Accessories*

Specifications:

The Bug-Free vent has a rustproof vinyl coating that resists gases, acids, alkalies, sun and weather. The vent is constructed of heavy 14 gauge top hat with a galvanized coupling and bronze screen. The screen area is 5.00 sq. in. (3226 sq. mm). The vent has a 2" Female NPT threaded connection.



Bug-Free Vent, 2" Female NPT
P/N: 075831

SWPA MEMBER

CRANE PUMPS & SYSTEMS — A Crane Co. Company
USA: (937) 778-8947 • Canada: (905) 457-6223 • International: (937) 615-3598
SECTION F PAGE 19 DATE 11/03

Moveable Fitting Assembly
1¼" NPT
for Stainless "C" Channel Guide Rails

BARNES PRESSURE SYSTEMS
www.cranepumps.com

PS-050 *Accessories*

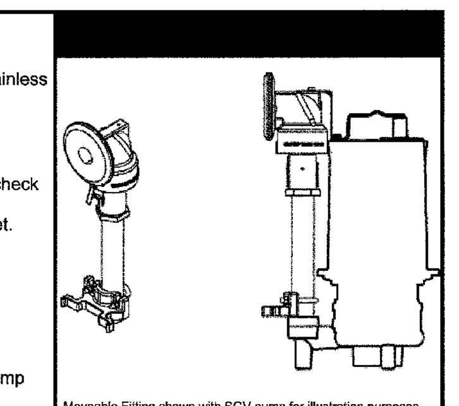
Specifications:

The Moveable Fitting assembly is used with the BARNES Stainless "C" Channel Guide Rails for installation in basins.

Each moveable assembly includes:
A stainless steel upper pump bracket with stainless hardware,stainless steel pipe nipples, cast iron flapper style check valve (powder coated) with resilient seat flapper, integrated anti-siphon and a cast iron powder coated lower guide bracket.

PUMP MODEL	SIZE-NPT Inch (mm)	PART No. W/ VALVE
OGP	1.25 (32)	116596B

Pump **Not** Included, Moveable fitting factory assembled to pump when ordered with basin package.



Moveable Fitting shown with SGV pump for illustration purposes only

Moveable Fitting Assembly
1¼" NPT Discharge

SWPA MEMBER

DESCRIPTION
THE BREAK AWAY FITTING IS DESIGNED TO ALLOW THE SUBMERSIBLE PUMP TO BE INSTALLED OR REMOVED WITHOUT REQUIRING PERSONNEL TO ENTER THE WET WELL.

CRANE PUMPS & SYSTEMS — A Crane Co. Company
USA: (937) 778-8947 • Canada: (905) 457-6223 • International: (937) 615-3598
SECTION F PAGE 7 DATE 11/03

COMMONWEALTH OF VIRGINIA — DAVID R. BUTLER Lic. No. 38395 10/2/13 PROFESSIONAL ENGINEER

PUMP STATION DETAILS

PORTSMOUTH TERMINAL FACILITY

PROJECT LOCATED IN: VIRGINIA BEACH, VIRGINIA			MADE FOR: PER PROPERTIES
DESIGN BY: BWG	DRAWN BY: JB	CHECKED BY: BWG	DATE: OCTOBER 2, 2013
GALLUP SURVEYORS & ENGINEERS, LTD. 323 FIRST COLONIAL ROAD VIRGINIA BEACH, VIRGINIA 23454 (757)428-8132 (757)425-2390 FAX			SCALE: N/A / SHEET 11/13 C11 / FILE NO.:

DATE	COMMENT

REVISION SCHEDULE

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GENERAL EROSION AND SEDIMENT CONTROL NOTES

ES–1: Unless otherwise indicated, all vegetative and structural erosion and sediment control practices will be constructed & maintained according to minimum standards and specifications of the Virginia Erosion & Sediment Control Regulations (4VAC50–30).

ES–2: All erosion and sediment control measures are to be placed prior to or as the first step in clearing.

ES–3: A copy of the approved erosion and sediment control plan shall be maintained on the site at all times.

ES–4: Prior to commencing land disturbing activities in areas other than indicated on these plans (including, but not limited to, off–site borrow or waste areas), the contractor shall submit a supplementary erosion control plan to the owner for review and approval by the City of Portsmouth.

ES–5: The contractor is responsible for installation of any additional erosion control measures necessary to prevent erosion and sedimentation as determined by the City Erosion & Sediment Control inspector.

ES–6: All disturbed areas are to drain to approved sediment control measures at all times during land disturbing activities and during site development until final stabilization is achieved, after which, upon approval of the City's Erosion & Sediment Contro inspector, the controls may be removed. Trapped sediment and the disturbed soil areas resulting from the removal of temporary measures shall be permanently stabilized to prevent further erosion and sedimentation.

ES–7: During dewatering operations, water shall be pumped into an approved filtering device.

ES–8: The contractor shall inspect all erosion control measures at least every 2 weeks and immediately after each runoff–producing rainfall event. Any necessary repairs or cleanup to maintain the effectiveness of the erosion control devices shall be made immediately.

ES–9: The contractor is responsible for the daily removal of sediment that has been transported onto a paved or public road surface.

ES–10: The contractor shall be responsible for preventing surface and air movement of dust from exposed soils which may present health hazards, traffic safety problems, or harm animal or plant life.

NOTE:

ALL LAND DISTURBING ACTIVITIES MUST CONFORM WITH THE APPLICABLE REGULATIONS OF THE CITY OF PORTSMOUTH CODES, ORDINANCES, AND PWSS AND THE VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION EROSION AND SEDIMENT CONTROL HANDBOOK. THE CONTRACTOR SHALL EXERCISE EVERY REASONABLE PRECAUTION, INCLUDING THE APPLICATION OF TEMPORARY AND/OR PERMANENT MEASURE DEEMED NECESSARY BEFORE, DURING, AND AFTER CONSTRUCTION TO CONTROL EROSION AND PREVENT/MINIMIZE SEDIMENT RUNOFF. THE ENGINEERING DEPARTMENT/PERMITS AND INSPECTIONS DIVISION SHALL ENFORCE THESE REQUIREMENTS. THE CITY INSPECTOR RESERVES THE RIGHT TO REQUIRE OTHER MEASURES NOT SPECIFICALLY DESCRIBED HEREIN TO CORRECT ANY EROSION OR SILTATION CONDITION.

TABLE 3.02-A

CONSTRUCTION SPECIFICATIONS FOR FILTER CLOTH UNDERLINER

Fabric Properties[1]	Light-Duty Entrance[2] (Graded Subgrade)	Heavy-Duty Entrance[3] (Rough Graded)	Test Method
Grab Tensile Strength (lbs.)	200	220	ASTM D1682
Elongation at Failure (%)	50	220	ASTM D1682
Mullen Burst Strength (lbs.)	190	430	ASTM D3786
Puncture Strength (lbs.)	40	125	ASTM D751 (modified)
Equivalent Opening Size (mm)	40-80	40-80	U.S. Standard Sieve CW-02215

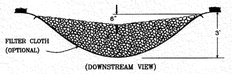
[1] Fabrics not meeting these specifications may be used only when design procedure and supporting documentation are supplied to determine aggregate depth and fabric strength.

[2] Light Duty Entrance: Sites that have been graded to subgrade and where most travel would be single axle vehicles and an occasional multi-axle truck. Examples of fabrics which can be used are: Trevira Spunbond 1115, Mirafi 100X, Typar 3401, or equivalent.

[3] Heavy Duty Entrance: Sites with only rough grading and where most travel would be multi-axle vehicles. Examples of fabrics which can be used are: Trevira Spunbond 1135, Mirafi 600X, or equivalent.

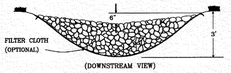
ROCK CHECK DAM

2 ACRES OR LESS OF DRAINAGE AREA:

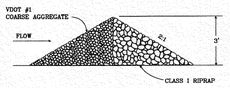


(DOWNSTREAM VIEW)

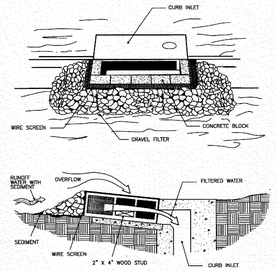
2–10 ACRES OF DRAINAGE AREA:



(DOWNSTREAM VIEW)



BLOCK & GRAVEL CURB INLET SEDIMENT FILTER

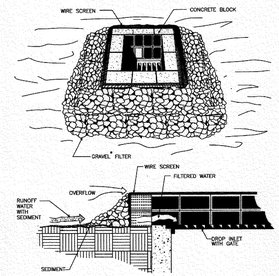


SPECIAL APPLICATION

THIS METHOD OF INLET PROTECTION IS APPLICABLE AT CURB INLETS WHERE AN OVERFLOW CAPABILITY IS NECESSARY TO PREVENT EXCESSIVE PONDING IN FRONT OF THE STRUCTURE.

* GRAVEL SHALL BE VDOT #3, #357 OR #5 COARSE AGGREGATE

BLOCK AND GRAVEL DROP INLET SEDIMENT FILTER

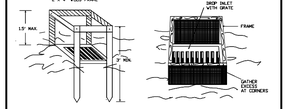


SPECIFIC APPLICATION

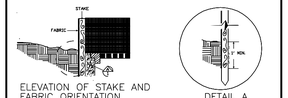
THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE HEAVY FLOWS ARE EXPECTED AND WHERE AN OVERFLOW CAPACITY IS NECESSARY TO PREVENT EXCESSIVE PONDING AROUND THE STRUCTURE.

* GRAVEL SHALL BE VDOT #3, #357 OR #5 COARSE AGGREGATE.

SILT FENCE DROP INLET PROTECTION



PERSPECTIVE VIEWS



ELEVATION OF STAKE AND FABRIC ORIENTATION

DETAIL A

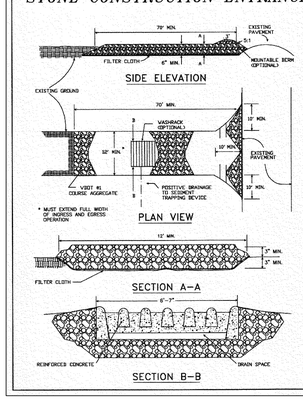
SPECIFIC APPLICATION

THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE THE INLET DRAINS A RELATIVELY FLAT AREA (SLOPE NO GREATER THAN 5%) WHERE SHEET OR OVERLAND FLOWS (NOT EXCEEDING 1 CFS) IS EXPECTED. THE METHOD SHALL NOT APPLY TO INLETS RECEIVING CONCENTRATED FLOWS, SUCH AS IN STREET OR HIGHWAY MEDIANS.

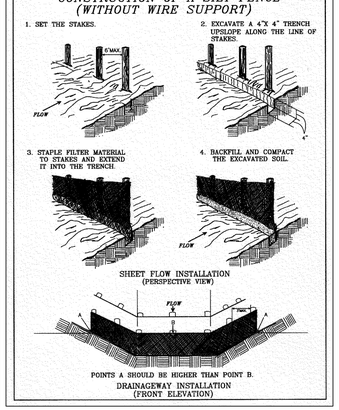
SOURCE: N.C. Erosion and Sediment Control Planning and Design Manual, 1988 — PLATE 3.07–1

(IP) INLET PROTECTION STANDARD & SPEC. 3.07

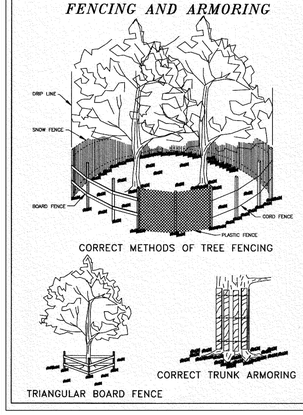
STONE CONSTRUCTION ENTRANCE



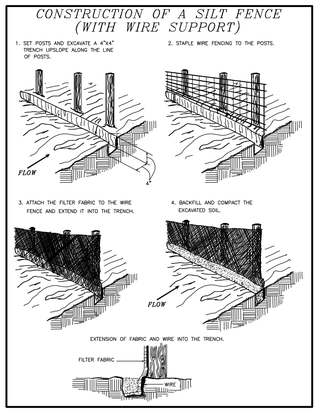
CONSTRUCTION OF A SILT FENCE (WITHOUT WIRE SUPPORT)



FENCING AND ARMORING



CONSTRUCTION OF A SILT FENCE (WITH WIRE SUPPORT)



(SF) SILT FENCE

CE		A GRAVEL PAD, LOCATED AT POINTS OF VEHICULAR INGRESS AND EGRESS ON A CONSTRUCTION SITE, TO REDUCE THE MUD TRANSPORTED ONTO PUBLIC ROADS AND OTHER PAVED AREAS.
PS	PS	ESTABLISHMENT OF PERENNIAL VEGETATIVE COVER BY PLANTING SEED ON ROUGH–GRADED AREAS THAT WILL NOT BE BROUGHT TO FINAL GRADE FOR A YEAR OR MORE OR WHERE PERMANENT, LONG–LIVED VEGETATIVE COVER IS NEEDED ON FINE–GRADED AREAS.
OP		THE INSTALLATION OF PAVED AND/OR RIPRAP CHANNEL SECTIONS AND/OR STILLING BASINS BELOW STORM DRAIN OUTLETS TO REDUCE EROSION FROM SCOURING AT OUTLETS AND TO REDUCE FLOW VELOCITIES BEFORE STORMWATER ENTERS RECEIVING CHANNELS BELOW THESE OUTLETS.
RR		A PERMANENT, EROSION RESISTANT GROUND COVER OF LARGE, LOOSE, ANGULAR STONE INSTALLED WHEREVER SOIL CONDITIONS, WATER TURBULENCE AND VELOCITY, EXPECTED VEGETATIVE COVER, ETC., ARE SUCH THAT SOIL MAY ERODE UNDER DESIGN FLOW CONDITIONS.
SF		A TEMPORARY SEDIMENT BARRIER CONSTRUCTED OF POSTS, NON–WOVEN FILTER FABRIC AND, IN SOME CASES, A WIRE SUPPORT FENCE, PLACED ACROSS OR AT THE TOE OF A SLOPE OR IN A MINOR DRAINAGEWAY TO INTERCEPT AND DETAIN SEDIMENT AND DECREASE FLOW VELOCITIES FROM DRAINAGE AREAS OF LIMITED SIZE; APPLICABLE WHERE SHEET AND RILL EROSION OR SMALL CONCENTRATED FLOWS MAY BE A PROBLEM. MAXIMUM EFFECTIVE LIFE IS 6 MONTHS.
IP		THE INSTALLATION OF VARIOUS KINDS OF SEDIMENT TRAPPING MEASURES AROUND DROP INLET OR CURB INLET STRUCTURES PRIOR TO PERMANENT STABILIZATION OF THE DISTURBED AREAS; LIMITED TO DRAINAGE AREAS NOT EXCEEDING ONE ACRE AND NOT INTENDED TO CONTROL LARGE, CONCENTRATED STORMWATER FLOWS.

TABLE 3.32-E
(Revised June 2003)
PERMANENT SEEDING SPECIFICATIONS FOR COASTAL PLAIN AREA

SEED[1]		
LAND USE	SPECIES	APPLICATION RATES
Minimum Care Lawn (Commercial or Residential)	Tall Fescue[1] or Bermudagrass[1]	175 - 200 lbs. 75 lbs.
High-Maintenance Lawn	Tall Fescue[1] or Bermudagrass[1] (seed) or Bermudagrass[1] (by other vegetative establishment method, see Std. & Spec. 3.34)	200-250 lbs. 40 lbs. (unhulled) 30 lbs. (hulled)
General Slope (3:1 or less)	Tall Fescue[1] Red Top Grass or Creeping Red Fescue Seasonal Nurse Crop[2]	128 lbs. 2 lbs. 20 lbs. TOTAL: 150 lbs.
Low-Maintenance Slope (Steeper than 3:1)	Tall Fescue[1] Bermudagrass[1] Red Top Grass or Creeping Red Fescue Seasonal Nurse Crop[2] Sericea Lespedeza[3]	93-108 lbs. 0-15 lbs. 2 lbs. 20 lbs. 20 lbs. TOTAL: 150 lbs.

1 - When selecting varieties of turfgrass, use the Virginia Crop Improvement Association (VCIA) recommended turfgrass variety list. Quality seed will bear a label indicating that they are approved by VCIA. A current turfgrass variety list is available at the local County Extension office or through VCIA at 804-746-4884 or at http://sudan.cses.vt.edu/html/Turf/turf/publications/publications2.html

2 - Use seasonal nurse crop in accordance with seeding dates as stated below:

February, March - April	Annual Rye
May 1st - August	Foxtail Millet
September, October - November 15th	Annual Rye
November 16th - January	Winter Rye

3 - May through October, use hulled seed. All other seeding periods, use unhulled seed. If Weeping Lovegrass is used, include in any slope or low maintenance mixture during warmer seeding periods, increase to 30 -40 lbs/acre.

FERTILIZER & LIME

- Apply 10-20-10 **fertilizer** at a rate of **500** lbs. / acre (or 12 lbs. / 1,000 sq. ft.)
- Apply **Pulverized Agricultural Limestone** at a rate of 2 tons/acre (or 90 lbs. / 1,000 sq. ft.)

NOTE:
- A soil test is necessary to determine the actual amount of lime required to adjust the soil pH of site.
- Incorporate the lime and fertilizer into the top 4 – 6 inches of the soil by disking or by other means.
- When applying Slowly Available Nitrogen, use rates available in Erosion & Sediment Control Technical Bulletin # 4, 2003 Nutrient Management for Development Sites at http://www.dcr.state.va.us/sw/e&s.htm#pubs

TABLE 3.32-D
(Revised June 2003)
PERMANENT SEEDING SPECIFICATIONS FOR PIEDMONT AREA

SEED[1]		
LAND USE	SPECIES	APPLICATION PER ACRE
Minimum Care Lawn (Commercial or Residential)	Tall Fescue[1] Perennial Ryegrass Kentucky Bluegrass[1]	95-100% 0-5% 0-5% TOTAL: 175-200 lbs.
High-Maintenance Lawn	Tall Fescue[1]	TOTAL: 200-250 lbs.
General Slope (3:1 or less)	Tall Fescue[1] Red Top Grass or Creeping Red Fescue Seasonal Nurse Crop[2]	128 lbs. 2 lbs. 20 lbs. TOTAL: 150 lbs.
Low-Maintenance Slope (Steeper than 3:1)	Tall Fescue[1] Red Top Grass or Creeping Red Fescue Seasonal Nurse Crop[2] Crownvetch[3]	108 lbs. 2 lbs. 20 lbs. 20 lbs. TOTAL: 150 lbs.

1 - When selecting varieties of turfgrass, use the Virginia Crop Improvement Association (VCIA) recommended turfgrass variety list. Quality seed will bear a label indicating that they are approved by VCIA. A current turfgrass variety list is available at the local County Extension office or through VCIA at 804-746-4884 or at http://sudan.cses.vt.edu/html/Turf/turf/publications/publications2.html

2 - Use seasonal nurse crop in accordance with seeding dates as stated below:

February 16th - April	Annual Rye
May 1st - August 15th	Foxtail Millet
August 16th - October	Annual Rye
November - February 15th	Winter Rye

3 - Substitute Sericea lespedeza for Crownvetch east of Farmville, VA (May through September use hulled seed, all other periods, use unhulled Sericea). If Flatpea is used, increase rate to 30 lbs./acre. If Weeping Lovegrass is used, include in any slope or low maintenance mixture during warmer seeding periods, increase to 30 -40

FERTILIZER & LIME

- Apply 10-20-10 **fertilizer** at a rate of **500** lbs. / acre (or 12 lbs. / 1,000 sq. ft.)
- Apply **Pulverized Agricultural Limestone** at a rate of 2 tons/acre (or 90 lbs. / 1,000 sq. ft.)

NOTE:
- A soil test is necessary to determine the actual amount of lime required to adjust the soil pH of site.
- Incorporate the lime and fertilizer into the top 4 – 6 inches of the soil by disking or by other means.
- When applying Slowly Available Nitrogen, use rates available in Erosion & Sediment Control Technical Bulletin # 4, 2003 Nutrient Management for Development Sites at http://www.dcr.state.va.us/sw/e&s.htm#pubs

TABLE 3.31-B
(Revised June 2003)
TEMPORARY SEEDING SPECIFICATIONS QUICK REFERENCE FOR ALL REGIONS

SEED		
APPLICATION DATES	SPECIES	APPLICATION RATES
Sept. 1 - Feb. 15	50/50 Mix of Annual Ryegrass (Iolium multi-florum) & Cereal (Winter) Rye (Secale cereale)	50 -100 (lbs/acre)
Feb. 16 - Apr. 30	Annual Ryegrass (Iolium multi-florum)	60 - 100 (lbs/acre)
May 1 - Aug. 31	German Millet	50 (lbs/acre)

FERTILIZER & LIME

- Apply 10-10-10 **fertilizer** at a rate of 450 lbs. / acre (or 10 lbs. / 1,000 sq. ft.)
- Apply **Pulverized Agricultural Limestone** at a rate of 2 tons/acre (or 90 lbs. / 1,000 sq. ft.)

NOTE:
1 - A soil test is necessary to determine the actual amount of lime required to adjust the soil pH of site.
2 - Incorporate the lime and fertilizer into the top 4 – 6 inches of the soil by disking or by other means.
3 - When applying Slowly Available Nitrogen, use rates available in Erosion & Sediment Control Technical Bulletin # 4, 2003 Nutrient Management for Development Sites at http://www.dcr.state.va.us/sw/e&s.htm#pubs

EROSION CONTROL DETAILS & NOTES

PORTSMOUTH TERMINAL FACILITY

PROJECT LOCATED IN: VIRGINIA BEACH, VIRGINIA	MADE FOR: PER PROPERTIES
DESIGN BY: DRB — DRAWN BY: JB — CHECKED BY: DRB	DATE:
SCALE: NO SCALE	SHEET 12/13 — C12
FILE NO.: .	

GALLUP
SURVEYORS & ENGINEERS, LTD.
323 FIRST COLONIAL ROAD
VIRGINIA BEACH, VIRGINIA 23454
(757)428–8132 (757)425–2390 FAX

G:\09\09–54–4 cbpa.dwg

G:\10-33 Salmon Portsmouth\10-32-5 e & s.dwg, 10/18/2013 8:40:02 AM, 1:40, JB

EROSION AND SEDIMENT CONTROL NARRATIVE

EROSION AND SEDIMENT CONTROL NARRATIVE

PROJECT DESCRIPTION

THE PURPOSE OF THIS PROJECT IS THE EVENTUAL CONSTRUCTION OF A MULTI-PURPOSE TRANSLOADING FACILITY. THE OWNER WILL CONSTRUCT A SERIES OF BUILDINGS, SILOS, A RAILROAD SIDING, AND A WHARF TO LOAD AND OFFLOAD AGRICULTURAL COMMODITIES, SUCH AS GRAIN. THE SITE IS SERVED BY CITY WATER. A PUMP AND FORCEMAIN WILL BE USED TO CONVEY EFFLUENT TO AN EXISTING SANITARY FORCEMAIN. THE PURPOSE OF THIS PARTICULAR PLAN IS TO SHOW GRADING AND FILLING NECESSARY TO CONSTRUCT THE PROPOSED FACILITY. THE PROPOSED WHARF NECESSARY TO ACCOMMODATE SHIP AND BARGE TRAFFIC WILL BE PERMITTED UNDER A STANDARD JOINT PERMIT PLAN. A COMMERCIAL SITE PLAN WILL BE SUBMITTED IN THE FUTURE FOR THE TRANSLOADING FACILITY. THE POST DEVELOPED IMPERVIOUS AREA WILL BE GREATER THAN THE IMPERVIOUSNESS OF THE WATERSHED. THE DISTURBED AREA DURING CONSTRUCTION WILL BE 11.2 ACRES.THE SITE IS CURRENTLY DENUDED AND PARTIALLY FILLED WITH GRAVEL AND CRUSHED CONCRETE.

EXISTING SITE CONDITIONS

THE PROPOSED SITE IS RELATIVELY FLAT (SLOPE < 1.5%) AND DRAINS TOWARDS THE RIVER MOST OF THE SITE CONSISTS OF A MIXTURE OF GRAVEL AND CRUSHED CONCRETE.

ADJACENT PROPERTY

ADJACENT PROPERTIES ARE INDUSTRIAL AND A NAVAL SHIPYARD. THE NORFOLK NAVAL SHIPYARD IS LOCATED ALONG THE NORTHERN BOUNDARY, THE SOUTHERN BRANCH OF THE ELIZABETH RIVER FORMS THE EASTERN BOUNDARY OF THE SITE AND ELM AVENUE IS LOCATED ALONG THE SOUTHERN END OF THE SITE. RECONSTRUCTION OF THE JORDAN BRIDGE, LOCATED ON ELM AVENUE, BEGAN THIS YEAR AND AS A RESULT, ELM AVENUE IN THIS AREA IS CLOSED. CONSTRUCTION OF THE PIER SITE, AND THE ATLANTIC WOOD INDUSTRIES SUPERFUND PROJECT WILL OCCUR SIMULTANEOUSLY.

OFF-SITE AREAS

MINOR WORK IS PROPOSED IN THE RIGHT OF WAYS TO INCLUDE UTILITY HOOKUPS. NO STREET CONSTRUCTION IS PROPOSED. ALL DEMOLISHED HARDSCAPE WILL BE HAULED TO AN APPROVED DUMP SITE. ALL CONCRETE EXISTING HAS BEEN CRUSHED AND SPREAD ONSITE.

SOILS

THE SOILS REPORT PERFORMED INDICATES A CLAYEY SAND, SILTY SAND, AND LOW PLASTICITY CLAY (MIXTURE) INDICATING A LOW TO AVERAGE ERODIBILITY. THE DEPTH TO THE LOCAL GROUNDWATER TABLE IS APPROXIMATELY 2-FEET TO 6.5-FEET BELOW THE GROUND SURFACE, WITH THE SEASONAL ADJUSTED HIGH WATER TABLE ELEVATION AT 2.0

CRITICAL EROSION AREAS

THE SITE HAS SLOPES RANGING FROM 0 TO 1.5 PERCENT INDICATING A LOW EROSION HAZARD ON THE HIGH GROUND, AND 10% SLOPES ALONG THE SHORE, INDICATING A HIGH POTENTIAL FOR EROSION. THE PROPOSED WHARF WILL STOP THE EROSION.

EROSION AND SEDIMENT CONTROL MEASURES

UNLESS OTHERWISE INDICATED, ALL VEGETATIVE AND STRUCTURAL EROSION AND SEDIMENT CONTROL PRACTICES SHALL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS OF THE HANDBOOK. THE MINIMUM STANDARDS OF THE VESCR SHALL BE ADHERED TO UNLESS OTHERWISE WAIVED OR APPROVED BY A VARIANCE. WAIVERS MAY BE APPROVED ONLY THROUGH WRITTEN VARIANCE REQUESTS APPROVED BY THE CITY OF PORTSMOUTH.

STRUCTURAL PRACTICES

SILT FENCE BARRIER – 3.05

SILT FENCE BARRIERS WILL BE INSTALLED DOWN SLOPE OF AREAS WITH MINIMAL GRADES TO FILTER SEDIMENT-LADEN RUNOFF FROM SHEET FLOW AS INDICATED ON THE PLAN. SILT FENCE BARRIERS WILL ALSO BE PLACED AROUND THE PERIMETER NEAR THE PROPERTY LINE AND AROUND THE STOCKPILE.

TEMPORARY CONSTRUCTION ENTRANCE – 3.02

TWO 12' X 80' AND ONE 12' X 62' GRAVEL CONSTRUCTION ENTRANCES WILL BE USED FOR CONSTRUCTION ACCESS AS SHOWN ON THIS PLAN. DURING MUDDY CONDITIONS, DRIVERS OF CONSTRUCTION VEHICLES WILL BE REQUIRED TO WASH THEIR WHEELS BEFORE ENTERING THE ROADWAY. A STANDARD STONE CONSTRUCTION ENTRANCE IS SPECIFIED ON THIS PLAN.

MANAGEMENT STRATEGIES

1. CONSTRUCTION WILL BE SEQUENCED SO THAT GRADING OPERATIONS CAN BEGIN AND END AS QUICKLY AS POSSIBLE
2. THE SITE IS BEING FILLED WITH GRAVEL AND CRUSHED CONCRETE. SEED AND MULCH IS NOT REQUIRED. INSTALLATION.
3. THE JOB SUPERINTENDENT SHALL BE RESPONSIBLE FOR THE INSTALLATION AND MAINTENANCE OF ALL EROSION AND SEDIMENT CONTROL PRACTICES.
4. AFTER ACHIEVING FULL DEVELOPMENT, THE TEMPORARY E&S CONTROLS WILL BE CLEANED UP AND REMOVED.
5. STOCKPILES OF SOIL SHALL RECEIVE TEMPORARY SEEDING.

PERMANENT STABILIZATION

FILL SLOPES WILL BE STABILIZED WITH GRAVEL AND/OR RIP RAP.

STORMWATER RUNOFF CONSIDERATIONS

THE SITE WILL UTILIZE PERFORATED PIPE SURROUNDED BY GRAVEL AND WILL ALLOW FOR INFILTRATION PROVIDING BOTH WATER QUALITY AND QUANTITY CONTROL.

MAINTENANCE

IN GENERAL, ALL EROSION AND SEDIMENT CONTROL MEASURES WILL BE CHECKED DAILY AFTER EACH SIGNIFICANT RAINFALL. THE FOLLOWING ITEMS WILL BE CHECKED IN PARTICULAR:

1. THE SILT FENCE BARRIER WILL BE CHECKED REGULARLY FOR UNDERMINING OR DETERIORATION OF THE FABRIC. SEDIMENT SHALL BE REMOVED WHEN THE LEVEL OF SEDIMENT DEPOSITION REACHES HALF WAY TO THE TOP OF THE BARRIER.
2. EROSION CONTROLS WILL BE CHECKED REGULARLY AND ACCUMULATED SEDIMENT SHALL BE REMOVED AS NEEDED TO ENSURE THE PROPER FUNCTION OF THE DEVICES.
3. INLET PROTECTION WILL BE CHECKED REGULARLY FOR SEDIMENT BUILDUP WHICH WILL PREVENT DRAINAGE. IF THE INLETS ARE CLOGGED BY SEDIMENT, THEY SHALL BE CLEANED OF SEDIMENT AND DEBRIS AND THE SEDIMENTS AND DEBRIS WILL BE HAULED TO AN APPROVED DUMP SITE.
4. THE DEVELOPER SHALL MAINTAIN THE STONE CONSTRUCTION ENTRANCES BY RE-DRESSING OR REPLACING THE STONE, AS NECESSARY, TO PREVENT TRACKING OF SEDIMENTS ONTO PAVED AREAS.

CALCULATIONS

PRE AND POST DEVELOPED 10-YEAR STORM RUNOFF CALCULATIONS HAVE BEEN PERFORMED AS WELL AS WATER QUALITY CALCULATIONS. SEE "STORMWATER RUNOFF CONSIDERATIONS" ABOVE.

MITIGATION

2,721 SQ. FT. OF VEGETATED WETLANDS LOCATED AT THE SOUTHWEST CORNER OF THE SITE WILL BE FILLED BY THE EPA WITH THE PROJECT KNOWN AS "EAST SIDE CONTAINMENT BERM ATLANTIC WOOD INDUSTRIES SUPERFUND SITE" A CASH IN LIEU OF AGREEMENT IS BEING WORKED OUT BY THE DEVELOPER AND THE STATE.

DCR PLAN REVIEW MINIMUM STANDARD CHECKLIST

YES NO NA

[X] [ ] [ ] MS-1 **Have temporary and permanent stabilization been addressed in narrative?**
[X] [ ] [ ] **Are practices shown on the plan?**
[X] [ ] [ ] **Seed specifications?**
[X] [ ] [ ] **Mulching?**
[X] [ ] [ ] **Gravel?**

(Permanent or temporary soil stabilization shall be applied to denuded areas within seven days after final grade is reached on any portion of the site. Temporary soil stabilization shall be applied within seven days to denuded areas that may not be at final grade but will remain dormant for longer than 30 days. Permanent stabilization shall be applied to areas that are to be left dormant for more than one year.)

[X] [ ] [ ] MS-2 **Has stabilization of soil stockpiles been addressed in narrative?**
[X] [ ] [ ] **Are sediment trapping measures provided?**

(During construction of the project, soil stock piles and borrow areas shall be stabilized or protected with sediment trapping measures. The applicant is responsible for the temporary protection and permanent stabilization of all soil stockpiles on site as well as borrow areas and soil intentionally transported from the project site.)

[X] [ ] [ ] MS-3 **Has maintenance of permanent stabilization been addressed?**

(A permanent vegetative cover shall be established on denuded areas not otherwise permanently stabilized. Permanent vegetation shall not be considered established until a ground cover is achieved that is uniform, mature enough to survive and will inhibit erosion.)

[ ] [ ] [X] MS-4 **Are sediment-trapping facilities to be constructed as a first step in LDA?**
[ ] [ ] [X] **Has maintenance of practices been addressed? (i.e. repair of structures and removal of accumulated sediment)**

(Sediment basins and traps, perimeter dikes, sediment barriers and other measures intended to trap sediment shall be constructed as a first step in any land-disturbing activity and shall be made functional before upslope land disturbance takes place.)

[ ] [ ] [X] MS-5 **Has stabilization of earthen structures been addressed?**

(Stabilization measures shall be applied to earthen structures such as dams, dikes and diversions immediately after installation.)

[ ] [ ] [X] MS-6 **Are sediment basins required where needed?**

(Sediment traps and sediment basins shall be designed and constructed based upon the total drainage area to be served by the trap or basin.
a. The minimum storage capacity of a sediment trap shall be 134 cubic yards per acre of drainage area and the trap shall only control drainage areas less than three acres.
b. Surface runoff from disturbed areas that is comprised of flow from drainage areas greater than or equal to three acres shall be controlled by a sediment basin. The minimum storage capacity of sediment basin shall be 134 cubic yards per acre of drainage area. The outfall system shall, at minimum, maintain the structural integrity of the basin during a 25-year storm of 24-hour duration. Runoff coefficients used in runoff calculations shall correspond to a bare earth condition or those conditions expected to exist while the sediment basin is utilized.)

[X] [ ] [ ] MS-7 **Has stabilization of cut and fill slopes been adequately addressed?**

(Cut and fill slopes shall be designed and constructed in a manner that will minimize erosion. Slopes that are found to be eroding excessively within one year of permanent stabilization shall be provided with additional slope stabilizing measures until the problem is corrected.)

[ ] [ ] [X] MS-8 **Are paved flumes, channels, or slope drains required where necessary?**

(Concentrated runoff shall not flow down cut or fill slopes unless contained within an adequate temporary or permanent channel, flume or slope drain structure.)

[ ] [ ] [X] MS-9 **Have water seeps from slope face, adequate drainage or other protection addressed?**

(Whenever water seeps from a slope face, adequate drainage or other protection shall be provided.)

[X] [ ] [ ] MS-10 **Is adequate inlet protection required on all operational storm sewer inlets?**

(All storm sewer inlets that are made operable during construction shall be protected so that sediment-laden water cannot enter the conveyance system without first being filtered or otherwise treated to remove sediment.)

[X] [ ] [ ] MS-11 **Are channel lining and/or outlet protection required on stormwater conveyance channels?**

(Before newly constructed stormwater conveyance channels or pipes are made operational, adequate outlet protection and any required temporary or permanent channel lining shall be installed in both the conveyance channel and receiving channel.)

[X] [ ] [ ] MS-12 **Are in-stream construction measures required so that channel damage is minimized?**

(When work in a live watercourse is performed, precautions shall be taken to minimize encroachment, control sediment transport and stabilize the work area to the greatest extent possible during construction. Nonerodible material shall be used for the construction of causeways and cofferdams. Earthen fill may be used for these structures if armored by nonerodible cover materials.)

[ ] [ ] [X] MS-13 **Are temporary stream crossings of non-erodible material required where necessary?**

(When a live watercourse must be crossed by construction vehicles more than twice in any sixmonth period, a temporary vehicular stream crossing constructed of nonerodible material shall be provided.)

[ ] [ ] [X] MS-14 **Are all applicable federal, state and local regulations pertaining to working it or crossing live watercourses being met?**

(All applicable federal, state and local chapters pertaining to working in or crossing live watercourses shall be met.)

[ ] [ ] [X] MS-15 **Has re-stabilization of areas subject to in-stream construction been adequately addressed?**

(The bed and banks of a watercourse shall be stabilized immediately after work in the watercourse is completed.)

[X] [ ] [ ] MS-16 **Has stabilization of utility trenches been addressed?**

(Underground utility lines shall be installed in accordance with the following standards in addition to other applicable criteria:
a. No more than 500 linear feet of trench may be opened at one time.
b. Excavated material shall be placed on the uphill side of trenches.
c. Effluent from dewatering operations shall be filtered or passed through an approved sediment-trapping device, or both, and discharged in a manner that does not adversely affect flowing streams or off-site property.
d. Material used for backfilling trenches shall be properly compacted in order to minimize erosion and promote stabilization.
e. Restabilization shall be accomplished in accordance with this chapter.
f. Applicable safety chapters shall be complied with.)

YES NO NA

[X] [ ] [ ] MS-17 **Has the prevention of transporting of soil and mud onto public roadways been adequately addressed? (i.e. Construction entrances, wash racks, daily cleaning of roadways, transport of sediment to a trapping facility.)**

(Where construction vehicle access routes intersect paved or public roads provisions shall be made to minimize the transport of sediment by vehicular tracking onto the paved surface. Where sediment is transported onto a paved or public road surface, the road surface shall be cleaned thoroughly at the end of each day. Sediment shall be removed from the roads by shoveling or sweeping and transported to a sediment control disposal area. Street washing shall be allowed only after sediment is removed in this manner. This provision shall apply to individual development lots as well as to larger land-disturbing activities)

[X] [ ] [ ] MS- 18 **Has the removal of temporary practices been addressed?**

(All temporary erosion and sediment control measures shall all be removed within 30 days after final site stabilization or after the temporary measures are no longer needed unless otherwise authorized by the local program authority. Trapped sediment and the disturbed soil areas resulting from the disposition of temporary measures shall be permanently stabilized to prevent further erosion and sedimentation.)

[X] [ ] [ ] MS-19 **Are properties and waterways downstream from the development adequately protected from erosion and sediment deposition due to increases in peak stormwater runoff?**

(Properties and waterways downstream from development sites shall be protected from sediment deposition, erosion and damage due to increases in volume, velocity and peak flow rate of stormwater runoff for the stated frequency storm of 24-hour duration in accordance with the following standards and criteria:
a. Concentrated stormwater runoff leaving a development site shall be discharged directly into an adequate natural or man-made receiving channel, pipe or storm sewer system. For those sites where runoff is discharged into a pipe or pipe system, downstream stability analyses at the outfall of the pipe or pipe system shall be performed.
b. Adequacy of all channels and pipes shall be verified in the following manner:
(1) The applicant shall demonstrate that the total drainage area to the point of analysis within the channel is one hundred times greater than the contributing drainage area of the project in question; or
(2) (a) Natural channels shall be analyzed by the use of a two-year storm to verify that stormwater will not overtop channel banks nor cause erosion of channel bed or banks.
(b) All previously constructed man-made channels shall be analyzed by the use of a ten-year storm to verify that stormwater will not overtop its banks and by the use of a two-year storm to demonstrate that stormwater will not cause erosion of channel bed or banks; and
(c) Pipes and storm sewer systems shall be analyzed by the use of a ten-year storm to verify that stormwater will be contained within the pipe or system.
c. If existing natural receiving channels or previously constructed man-made channels or pipes are not adequate, the applicant shall:
(1) Improve the channels to a condition where a ten-year storm will not overtop the banks and a two-year storm will not cause erosion to channel the bed or banks; or
(2) Improve the pipe or pipe system to a condition where the ten-year storm is contained within the appurtenances;
(3) Develop a site design that will not cause the pre-development peak runoff rate a two-year storm to increase when runoff outfalls into a natural channel or will not cause the pre-development peak runoff rate from a ten-year storm to increase when runoff outfalls into a man-made channel; or
(4) Provide a combination of channel improvement, stormwater detention or other measures which is satisfactory to the plan approving authority to prevent downstream erosion.
d. The applicant shall provide evidence of permission to make the improvements.
e. All hydrologic analyses shall be based on the existing watershed characteristics and the ultimate development condition of the subject project.
f. If the applicant chooses an option that includes stormwater detention, he shall obtain approval from the locality of a plan for maintenance of the detention facilities. The plan shall set forth the maintenance requirements of the facility and the person responsible for performing the maintenance.
g. Outfall from a detention facility shall be discharged to a receiving channel, and energy dissipators shall be placed at the outfall of all detention facilities as necessary to provide a stabilized transition from the facility to the receiving channel.
h. All on-site channels must be verified to be adequate.
i. Increased volumes of sheet flows that may cause erosion or sedimentation on adjacent property shall be diverted to a stable outlet, adequate channel, pipe or pipe system, or to a detention facility.
j. In applying these stormwater management criteria, individual lots or parcels in a residential, commercial or industrial development shall not be considered to be separate development projects. Instead, the development, as a whole, shall be considered a single development project. Hydrologic parameters that reflect the ultimate development condition shall be used in all engineering calculations.
k. All measures used to protect properties and waterways shall be employed in a manner which minimizes impacts on the physical, chemical and biological integrity of rivers, streams and other waters of the state.

COMMONWEALTH OF VIRGINIA
DAVID R. BUTLER
Lic. No. 38395
9-2-13
PROFESSIONAL ENGINEER

DATE	COMMENT

REVISION SCHEDULE

EROSION CONTROL NOTES

PORTSMOUTH TERMINAL FACILITY

PROJECT LOCATED IN: VIRGINIA BEACH, VIRGINIA
MADE FOR: PER PROPERTIES
DESIGN BY: BWG | DRAWN BY: JB | CHECKED BY: BWG
DATE: OCTOBER 2, 2013
SCALE: NO SCALE
SHEET 13/13 C13
FILE NO.: .

GALLUP
SURVEYORS & ENGINEERS, LTD.
323 FIRST COLONIAL ROAD
VIRGINIA BEACH, VIRGINIA 23454
(757)428-8132 (757)425-2390 FAX

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